

# Service Manual

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**Revision** : 0  
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**Page** : P.1 of 75

**In House Model No. : PDP421D**  
**Customer Model No. : PDP4225M**

**BOM No** : PDP421DMIA1BS -A02

Description : Service Manual for PDP4225M FHP (A3) USA

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Received By: **MK Department**

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# SERVICE MANUAL

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**Model:**

**PDP4225M**





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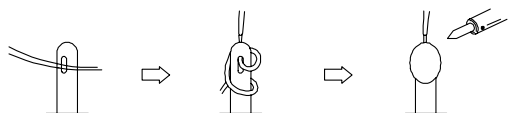
This manual is the latest at the time of printing, and does not include the modification which may be made after the printing, by the constant improvement of product.

# Safety Precaution

 <div><b>CAUTION</b> <b>RISK OF ELECTRIC SHOCK</b> <b>DO NOT OPEN</b></div> 	 <p>The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.</p>
<p><b>CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL ONLY.</b></p>	 <p>The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.</p>

## PRECAUTIONS DURING SERVICING

1. In addition to safety, other parts and assemblies are specified for conformance with such regulations as those applying to spurious radiation. These must also be replaced only with specified replacements.  
Examples: RF converters, tuner units, antenna selection switches, RF cables, noise-blocking capacitors, noise-blocking filters, etc.
2. Use specified internal Wiring. Note especially:
  - 1) Wires covered with PVC tubing
  - 2) Double insulated wires
  - 3) High voltage leads
3. Use specified insulating materials for hazardous live parts. Note especially:
  - 1) Insulating Tape
  - 2) PVC tubing
  - 3) Spacers (insulating barriers)
  - 4) Insulating sheets for transistors
  - 5) Plastic screws for fixing micro switches
4. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.), wrap ends of wires securely about the terminals before soldering.



5. Make sure that wires do not contact heat generating parts (heat sinks, oxide metal film resistors, fusible resistors, etc.)
6. Check if replaced wires do not contact sharply edged or pointed parts.
7. Make sure that foreign objects (screws, solder droplets, etc.) do not remain inside the set.

## MAKE YOUR CONTRIBUTION TO PROTECT THE ENVIRONMENT

Used batteries with the ISO symbol



for recycling as well as small accumulators (rechargeable batteries), mini-batteries (cells) and starter batteries should not be thrown into the garbage can.

Please leave them at an appropriate depot.

### WARNING:

Before servicing this TV receiver, read the SAFETY INSTRUCTION and PRODUCT SAFETY NOTICE.

## SAFETY INSTRUCTION

The service should not be attempted by anyone unfamiliar with the necessary instructions on this apparatus. The following are the necessary instructions to be observed before servicing.

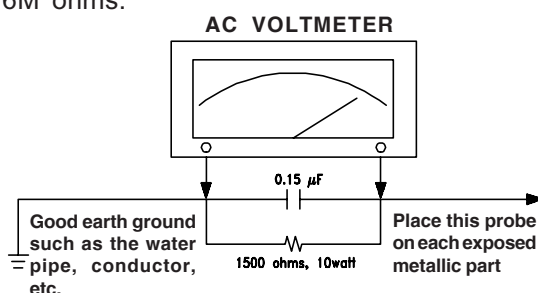
1. An isolation transformer should be connected in the power line between the receiver and the AC line when a service is performed on the primary of the converter transformer of the set.
2. Comply with all caution and safety related provided on the back of the cabinet, inside the cabinet, on the chassis or picture tube.
3. To avoid a shock hazard, always discharge the picture tube's anode to the chassis ground before removing the anode cap.
4. Completely discharge the high potential voltage of the picture tube before handling. The picture tube is a vacuum and if broken, the glass will explode.

5. When replacing a MAIN PCB in the cabinet, always be certain that all protective are installed properly such as control knobs, adjustment covers or shields, barriers, isolation resistor networks etc.
6. When servicing is required, observe the original lead dressing. Extra precaution should be given to assure correct lead dressing in the high voltage area.
7. Keep wires away from high voltage or high temperature components.
8. Before returning the set to the customer, always perform an AC leakage current check on the exposed metallic parts of the cabinet, such as antennas, terminals, screwheads, metal overlay, control shafts, etc., to be sure the set is safe to operate without danger of electrical shock. Plug the AC line cord directly to the AC outlet (do not use a line isolation transformer during this check). Use an AC voltmeter having 5K ohms volt sensitivity or more in the following manner.  
Connect a 1.5K ohm 10 watt resistor paralleled by a 0.15 $\mu$ F AC type capacitor, between a good earth ground (water pipe, conductor etc.,) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination of the 1.5K ohm resistor and 0.15  $\mu$ F capacitor. Reverse the AC plug at the AC outlet and repeat the AC voltage measurements for each exposed metallic part.

The measured voltage must not exceed 0.3V RMS.

This corresponds to 0.5mA AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.

The resistance measurement should be done between accessible exposed metal parts and power cord plug prongs with the power switch "ON". The resistance should be more than 6M ohms.



**AC Leakage Current Check**

## PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this apparatus have special safety-related characteristics.

These characteristics are offered passed unnoticed by visual inspection and the protection afforded by them cannot necessarily be obtained by using replacement components rated for a higher voltage, wattage, etc.

The replacement parts which have these special safety characteristics are identified by  $\triangle$  marks on the schematic diagram and on the parts list.

Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create shock, fire, or other hazards.

9. Must be sure that the ground wire of the AC inlet is connected with the ground of the apparatus properly.

## 1. Standard Test Conditions

All tests shall be performed under the following conditions, unless otherwise specified.

- 1.1 Ambient light : 150ux (When measuring  $I_B$ , the ambient luminance  $\leq 0.1 \text{Cd/m}^2$ )
- 1.2 Viewing distance : 50cm in front of PDP
- 1.3 Warm up time : 30 minutes
- 1.4 PDP Panel facing : no restricted
- 1.5 Measuring Equipment : PC, Chroma 2225 signal generator (with Chroma digital additional card) or equivalent, Minolta CA100 photometer
- 1.6 Magnetic field : no restricted
- 1.7 Control settings : Brightness, Contrast, Tint, Color set at Center(50)
- 1.8 Power input : 100~120Vac 60Hz
- 1.9 Ambient temperature :  $20^\circ\text{C} \pm 5^\circ\text{C}$  ( $68^\circ\text{F} \pm 9^\circ\text{F}$ )
- 1.10 Display mode : Resolution 1024 (H) x 1024 (V) Pixels
- 1.11 Other conditions :
  - 1.11.1 With image sticking protection of PDP module, the luminance will descend by time on a same still screen and rapidly go down in 5 minutes. When measuring the color tracking and luminance of a same still screen, be sure to accomplish the measurement in one minute to ensure its accuracy.
  - 1.11.2 Due to the structure of PDP, the extra-high-bright same screen should not hold over 5 minutes for fear of branding on the panel.

## **ELECTRICAL CHARACTERISTICS**

### **2. Power Input**

2.1	<u>Voltage</u>	:	100 ~120VAC	60Hz
2.2	<u>Input Current</u>	:	5.0 /2.5A	
2.3	<u>Maximum Inrush Current</u>	:	<30 A (FOR AC110V ONLY)	
	Test condition	:	Measured when switched off for at least 20 mins	
2.4	<u>Frequency</u>	:	60Hz(±3Hz)	
2.5	<u>Power Consumption</u>	:	330W Typical	
	Test condition	:	full white display with maximum brightness and contrast	
2.6	<u>Power Factor</u>	:	Meets IEC1000-3-2	
2.7	<u>Withstanding voltage</u>	:	1.5kVac or 2.2kVdc for 1 sec	

### **3. Display**

3.1	Screen Size	:	42" Plasma display
3.2	Aspect Ratio	:	16:9
3.3	Pixel Resolution	:	852x480
3.4	Peak Brightness	:	1400 cd/m <sup>2</sup> (Typical, Panel only)
3.5	Contrast Ratio (Dark room)	:	3000:1 (Ratio, Typical, in a dark room, Panel only)
3.6	Viewing Angle	:	Over 160°
3.7	OSD language	:	English,French,Spanish.

### **4. Signal**

4.1	<u>AV &amp; Graphic input</u>		
4.1.1	Composite signal	:	AV
4.1.2	Y,C Signal	:	S-Video
4.1.3	Component signal	:	YPbPr, HDMI,VGA compatible
4.1.4	Graphic I/P	:	Analog: D-sub 15pin detachable cable Digital:HDMI
4.1.5	EDID compatibility	:	DDC 1.3
4.1.6	I/P frequency	:	f <sub>H</sub> : 31.5kHz to 60kHz/f <sub>V</sub> : 56.25Hz to 75Hz(1024x768 recommended)

- 4.2 Audio input
- VGA(D-Sub 15 Pin Type) ×1  
D-Sub 9 Pin (RS-232 Input) × 1  
HDMI (Ver. 1.1) connector × 1  
S-Video (Mini Din 4 Pin) × 1  
Video Input (RCA Type) × 1  
YPbPr x 2  
Stereo , Audio × 6
- 4.3 Audio output
- Audio&Video Output (RCA Type) × 1, SPDIF(Optical) x 1

PIP/PBP, Picture size, Picture Still, Sound mode,Last memory, Timer

5. Environment

5.1 Operating environment

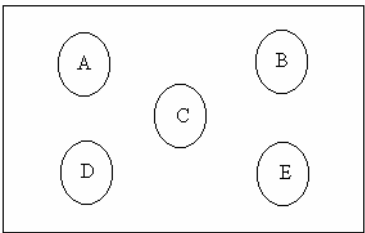
- 5.1.1 Temperature
- :
- 5° to 33°C
- 5.1.2 Relative humidity:
- 20% to 85%(non-condensing)

5.2 Storage and Transport

- 5.2.1 Temperature
- :
- 20°C to 60°C(-4° to 140°F)
- 5.2.2 Relative humidity:
- 5% to 95%

6. Panel Characteristics

- 6.1 Type
- :
- FHP(A3)
- 6.2 Size
- :
- 42",932.94mm(W)X532.80mm(H)  
(W/Ostand)
- 6.3 Aspect ratio
- :
- 16:9
- 6.4 Viewing angle
- :
- Over 160°
- 6.5 Resolution
- :
- 1024X1024
- 6.6 Weight
- :
- 39.2kg (Net)
- 6.7 Color
- :
- 16.7 millions of colors (R/G/B each 256 scales)
- 6.8 Contrast
- :
- Average 60:1 (In a bright room with 150Lux at center)  
Typical 10000:1 (In a dark room 1/100 White Window pattern at center).
- 6.9 Peak brightness
- :
- Typical 1500cd/m² (1/25 White Window)
- 6.10 Color Coordinate Uniformity
- :
- Contrast; Brightness and Color control at normal setting  
Full white pattern



Average of point A,B,C,D and E +/- 0.01

6.11 Color temperature : Contrast at center (50); Brightness center (50);  
Color temperature set at Natural  
 $x=0.285\pm0.02$   
 $y=0.290\pm0.02$

6.12 Cell Defect Specifications  
Subject to Panel supplier specification as appends.

## 7. Front Panel Control Button

7.1 SEL. Up / Down Button : Select the Up/Down item in OSD menu.  
VOL. Left/Right Button : Push the key to increase the volume left or right.  
When selecting the adjusting item in OSD menu  
increase or decrease the data-bar.  
MENU Button : Display or Exit the OSD menu.  
SOURCE Button : Press this button and use up/down button to select  
the signal sources. AV, S-Video, YPbPr 1, YPbPr 2,  
VGA or HDMI.

7.2 STANDBY Button : Switch on main power, or switch off to enter power  
Saving modes.

7.3 Main Power Switch : Turn on or off the unit.

## 8. OSD Function

8.1 Picture : Brightness; Contrast; Saturation; Peaking; Phase; Sharpness; Frequency;  
Picture Mode (Normal, Bright, Cinema, User);  
Color Temp (Warm, Normal, Cool); etc.

8.2 Window : Image Size (Fill All, Force 4:3, Letter Box, Wide, Anamorphic, etc);  
H Position; V Position; H Resolution; Freeze Window (Off, On)

8.3 Audio : Balance; Audio Mode (BBE, Cinema, Music, News, User)  
(Internal, External); AVC (Off, On)  
Equalizer (120Hz, 500Hz, 1.2kHz, 3kHz, 12kHz)

8.4 Options : Osd Timeout (5 Sec, 15 Sec, 60 Sec); Menu Background (Opaque,  
Translucent); Language(English, French, Spanish); Default Setting;  
Close Caption Mode; Close Caption; Content Blocking; Timer

8.5 Layout : Full Screen; PIP; Split Screen



## 9. Agency Approvals

Safety : UL, FCC, FDA  
Emissions : UL, FCC, FDA

## 10. Reliability

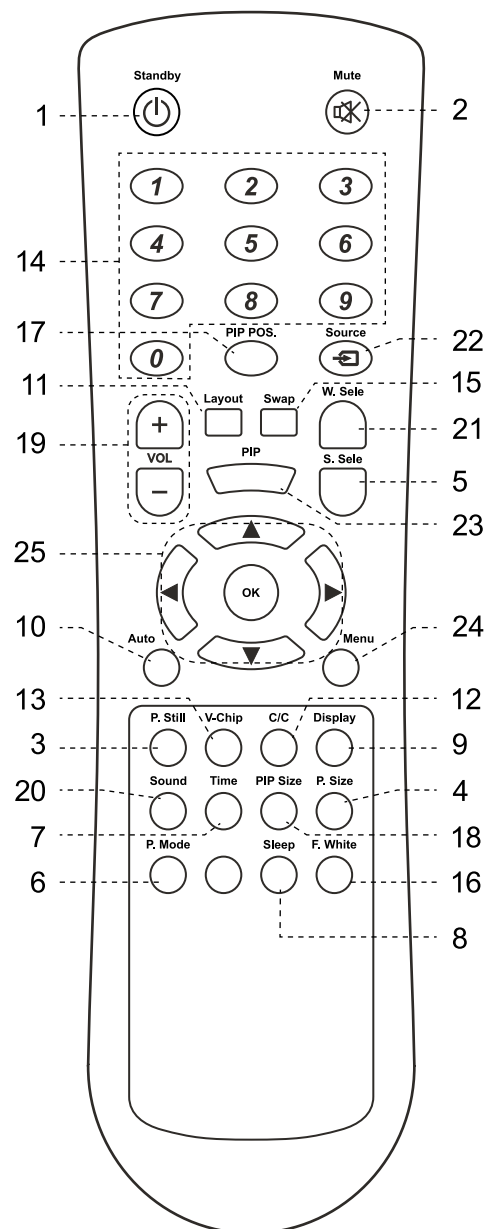
MTBF : 20,000 hours(Use moving picture signal at 25°C ambient)

## 11. Accessories

User manual x1, Remote control x1, Stand x 1, Battery x 2, AC Cable x 1

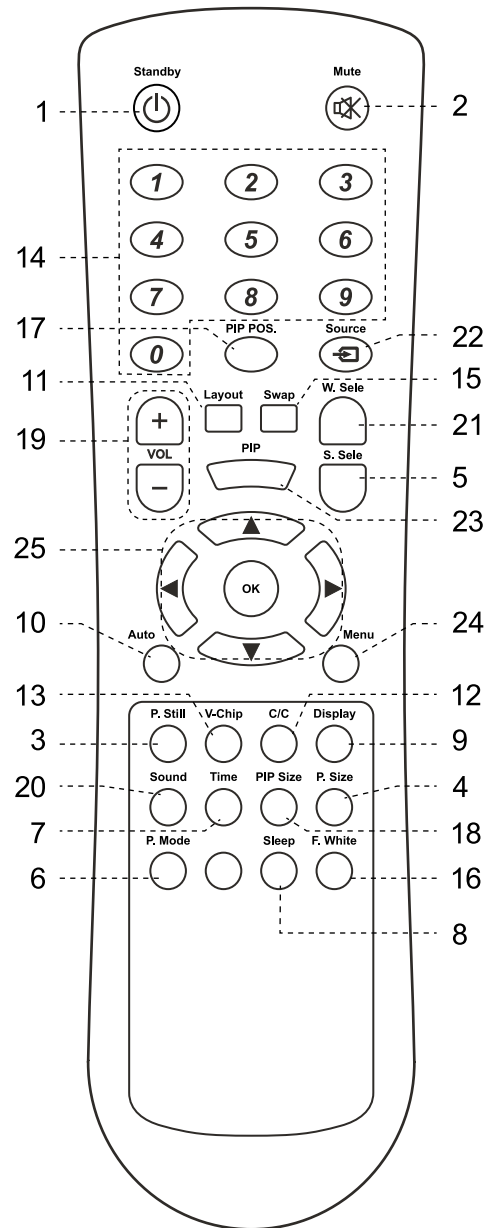
## 12. Remote Control

- 1 **Standby**(⏻): Press this button to turn off to standby and turn on from standby.
- 2 **Mute**(⏻): Press this button to quiet the sound system. Press again to reactivate the sound system.
- 3 **P. Still**: Press this button to hold on the screen. Press again to normal.
- 4 **P. Size**: When the input source is YPbPr 1, YPbPr 2, VGA or HDMI, press this button, the picture will change according to Fill All, Force 4:3, Letter Box, Wide or Anamorphic. When the input source is AV or S-Video, press this button, the picture will change according to Fill All, 4:3, Letter Box, Wide or Anamorphic.
- 5 **S. Sele**: Press this button to select the sound output from Main Window or Sub Window.
- 6 **P. Mode** : Press the button to select different picture effect.
- 7 **Time**: Press this button to pop up the "Clock Set" menu.
- 8 **Sleep**: Press this button to select the sleep time.
- 9 **Display**: Press the button to display the source information.
- 10 **Auto**: The Display automatically adjusts the phase, vertical / horizontal position when pressing this button in VGA mode.
- 11 **Layout**: Press this button to pop up Layout menu.
- 12 **C/C**: Press this button to enter the Closed Caption Function. (Only for AV or S-Video)



(Continued on next page)

- 13 **V-Chip**: Press this button to enter the V-Chip Function. (Only for AV or S-Video)
- 14 **Number buttons**: Use these buttons to enter the password.
- 15 **Swap**: Press this button to switch the Main window or Sub window pictures in PIP and Split Screen.
- 16 **F. White**: Press this button to show a full white picture.
- 17 **PIP POS.** : Press the button to select different Image Position in PIP Mode.
- 18 **PIP Size** : Press the button to select different Image Size in PIP Mode.
- 19 **VOL +/-** : Press these buttons to increase or decrease the volume.
- 20 **Sound**: Press the button to select different sound effect.
- 21 **W. Sele**: Press this button to select the Main Window or Sub Window.
- 22 **Source**: Press this button and use ▲ / ▼ button to select the signal sources. AV, S-Video, YPbPr 1, YPbPr 2, VGA or HDMI.
- 23 **PIP**: Press this button to change different Picture Mode.
- 24 **Menu**: Press this button to pop up the OSD Menu and press it again to exit the OSD Menu.
- 25 **OK** : Press to enter or confirm.
- ◀ / ▶ : They are used as ◀ / ▶ buttons in the OSD Menu screen.
- ▲ / ▼ : They are used as ▲ / ▼ buttons in the OSD Menu screen.
- They also can be used for the selection of the program when the OSD Menu is not shown on the screen, but only for the Model with Tuner.



### 13. Support the Signal Mode

#### 13.1. VGA Mode, HDMI Mode or HDTV Mode (YPbPr 1 or YPbPr 2)

Mode	Resolution	Horizontal Frequency (kHz)	Vertical Frequency (Hz)	Dot Clock Frequency (MHz)
VGA Mode	640 x 480	31.50	60.00	25.18
	800 x 600	37.90	60.32	40.00
	1024 x 768	48.40	60.00	65.00
	1280 x 1024	64.00	60.01	108.00
HDMI Mode	1080i	33.75	60.00	74.25
	720p	45.00	60.00	74.25
	480p	31.468	59.94	27.00
HDTV Mode (YPbPr1/YPbPr2)	1080i	33.75	60.00	74.25
	720p	45.00	60.00	74.25
	480p	31.468	59.94	27.00
	480i	15.734	59.94	13.50

#### 13.2.PIP/PBP Screen Mode

Items			VGA (Max.)	HDMI/YPbPr1/YPbPr2		
				480p	720p	1080i
PIP	Main		1024 x 768	OK	OK	OK
	Sub	Large	1024 x 768	OK	OK	OK
		Middle	1024 x 768	OK	OK	X
		Small	1024 x 768	OK	OK	X
PBP	Main		1024 x 768	OK	OK	OK
	Sub		1024 x 768	OK	OK	OK

**Note:**

- "X" means out of range (can not show).
- When the signal received by the Display exceeds the allowed range, a warning message shall appear on the screen.
- You can confirm the input signal format from the on-screen.
- VGA 1280 x 1024 Mode don't recommend working in PIP/PBP Screen Mode.

**PHYSICAL CHARACTERISTICS**

**14. Power Cord**

Length : 1.8m nominal  
Type : optional

**15. Cabinet**

15.1 Color : black colour as defined by colour plaque reference number

15.2 Weight(W/Ostand)

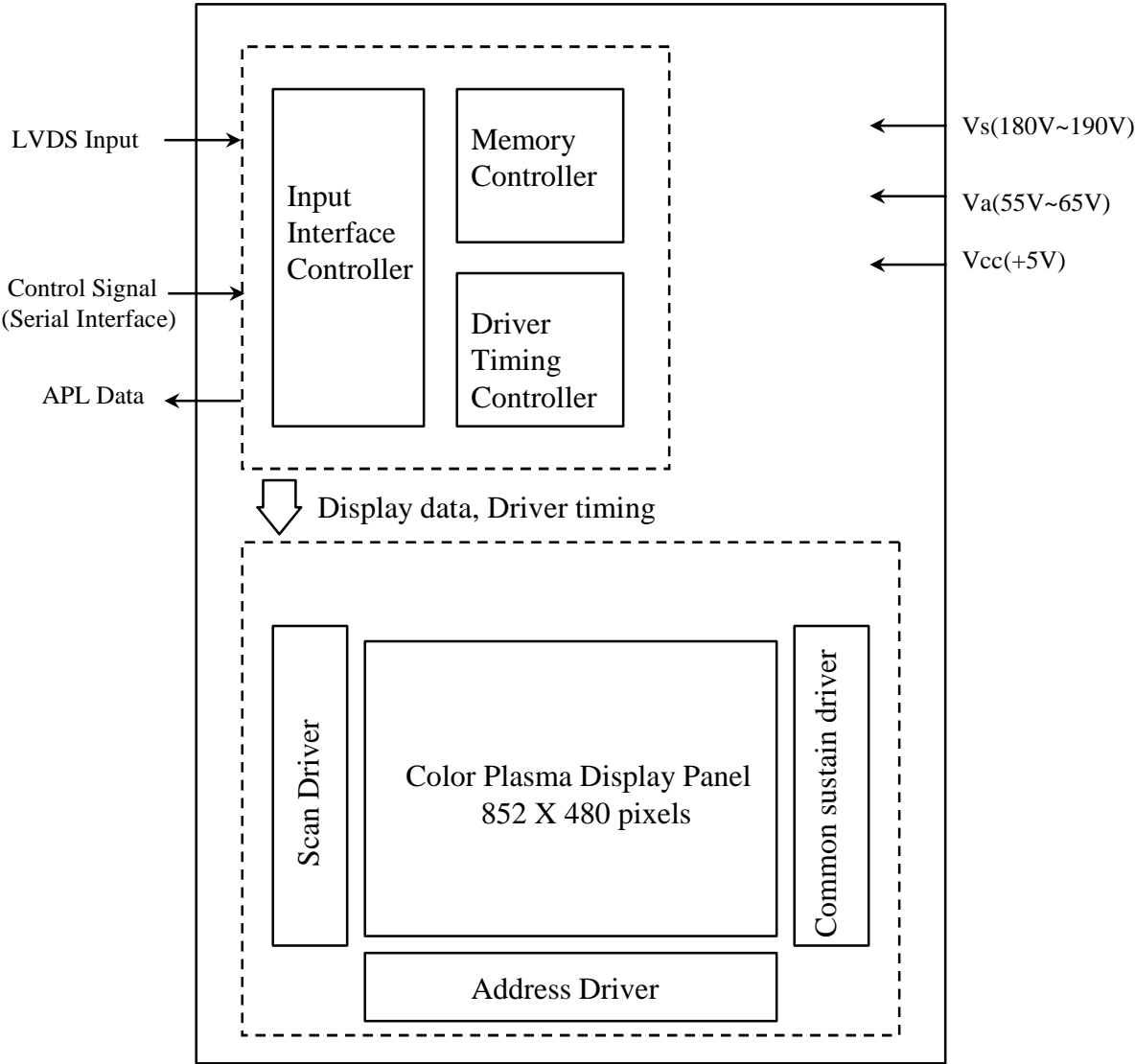
Net weight : 39.2kg

15.3 Dimensions (W/O stand&handles)

Width : 1039.8mm  
Height : 719.9mm  
Depth : 109.5mm

# Block Diagram

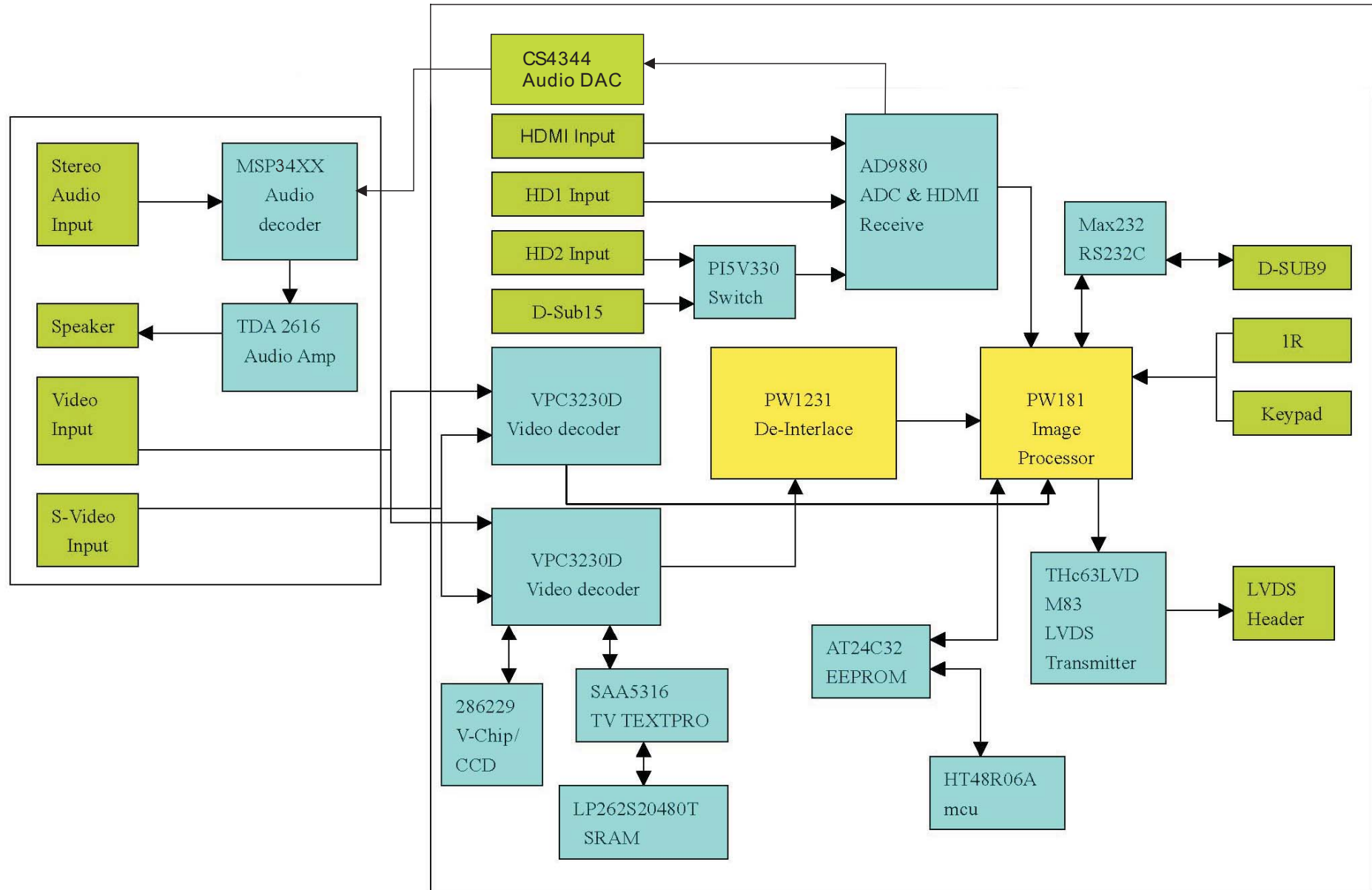
## Product Specification of PDP Module



Applied Voltage level is specified at the time when Full-White pattern is displayed on the panel.

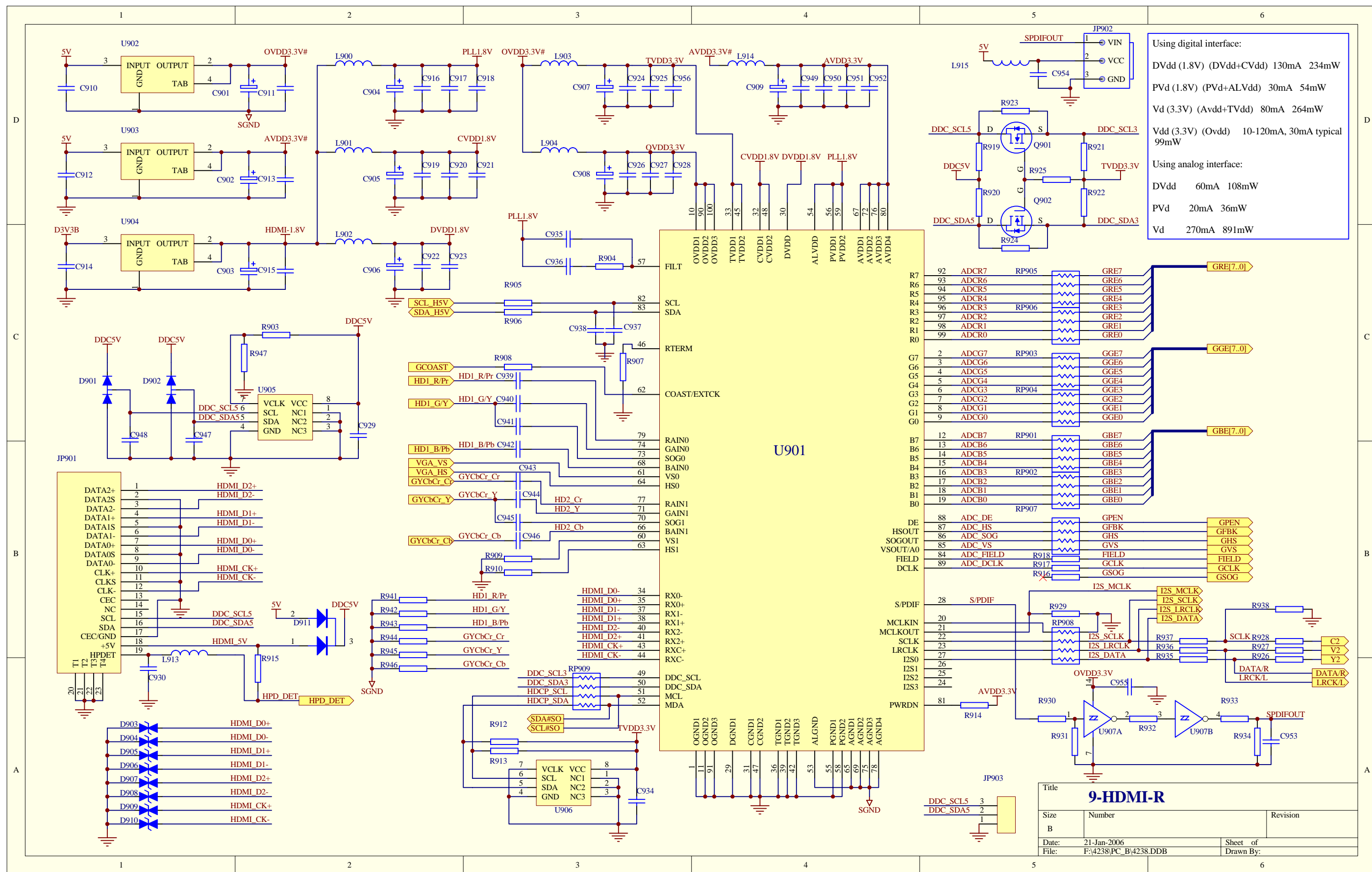
## Block Diagram

## MAIN/AUDIO BOARD



## **Circuit Diagram**

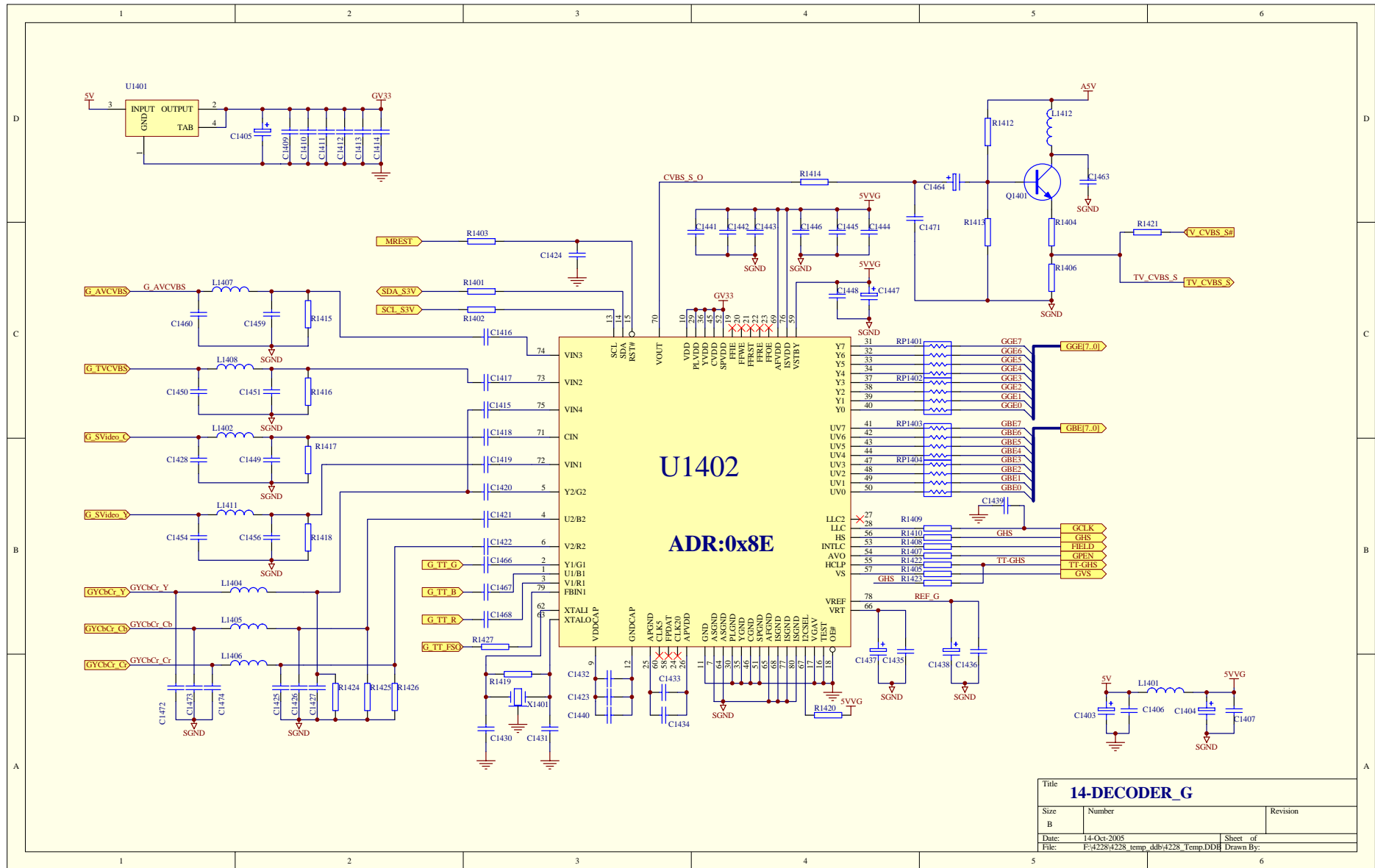
- **Main (Video) board**
- **Audio/Tuner board**
- **Keypad board**
- **Remote control receiver board**
- **Remote control board**



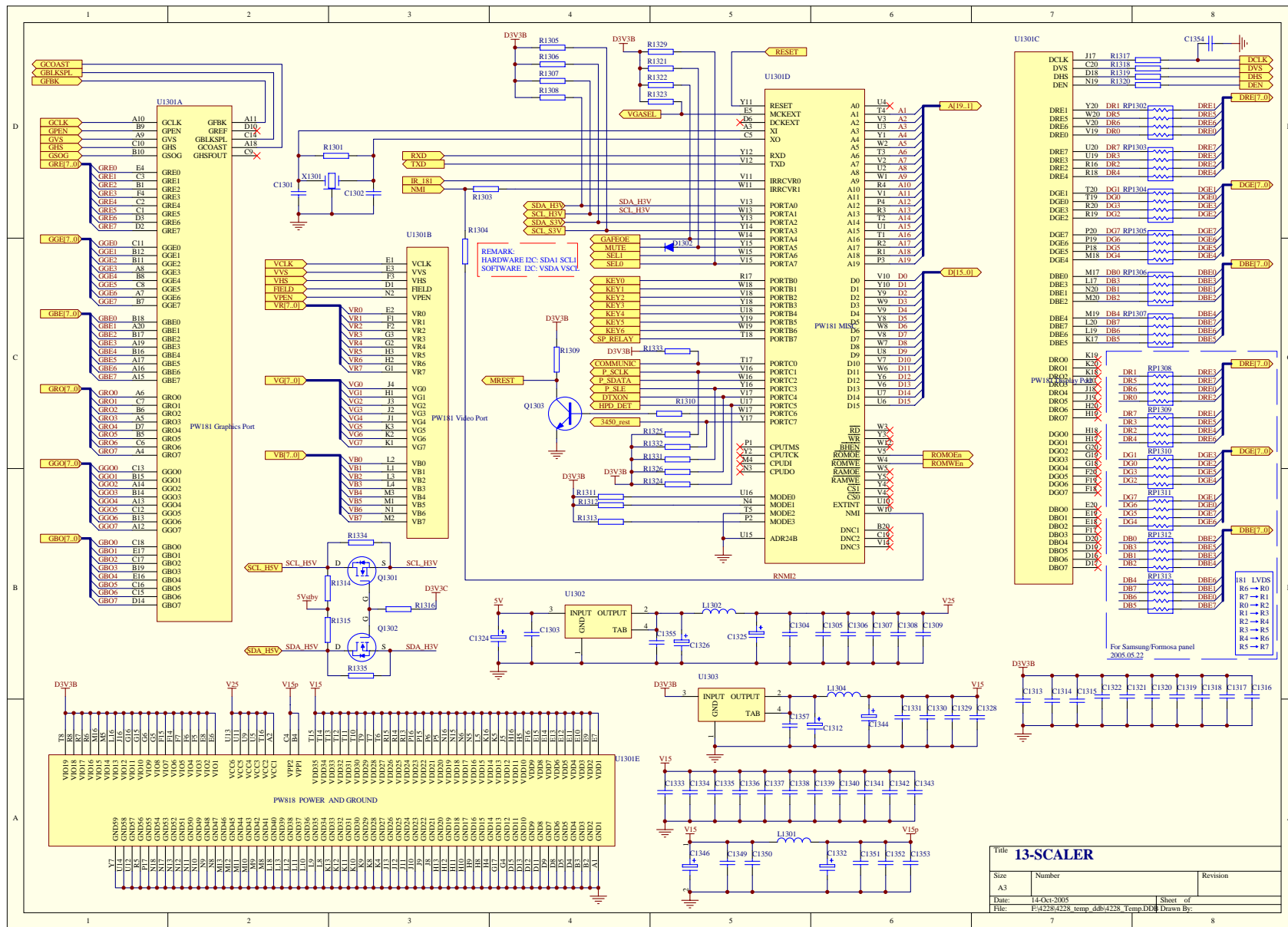






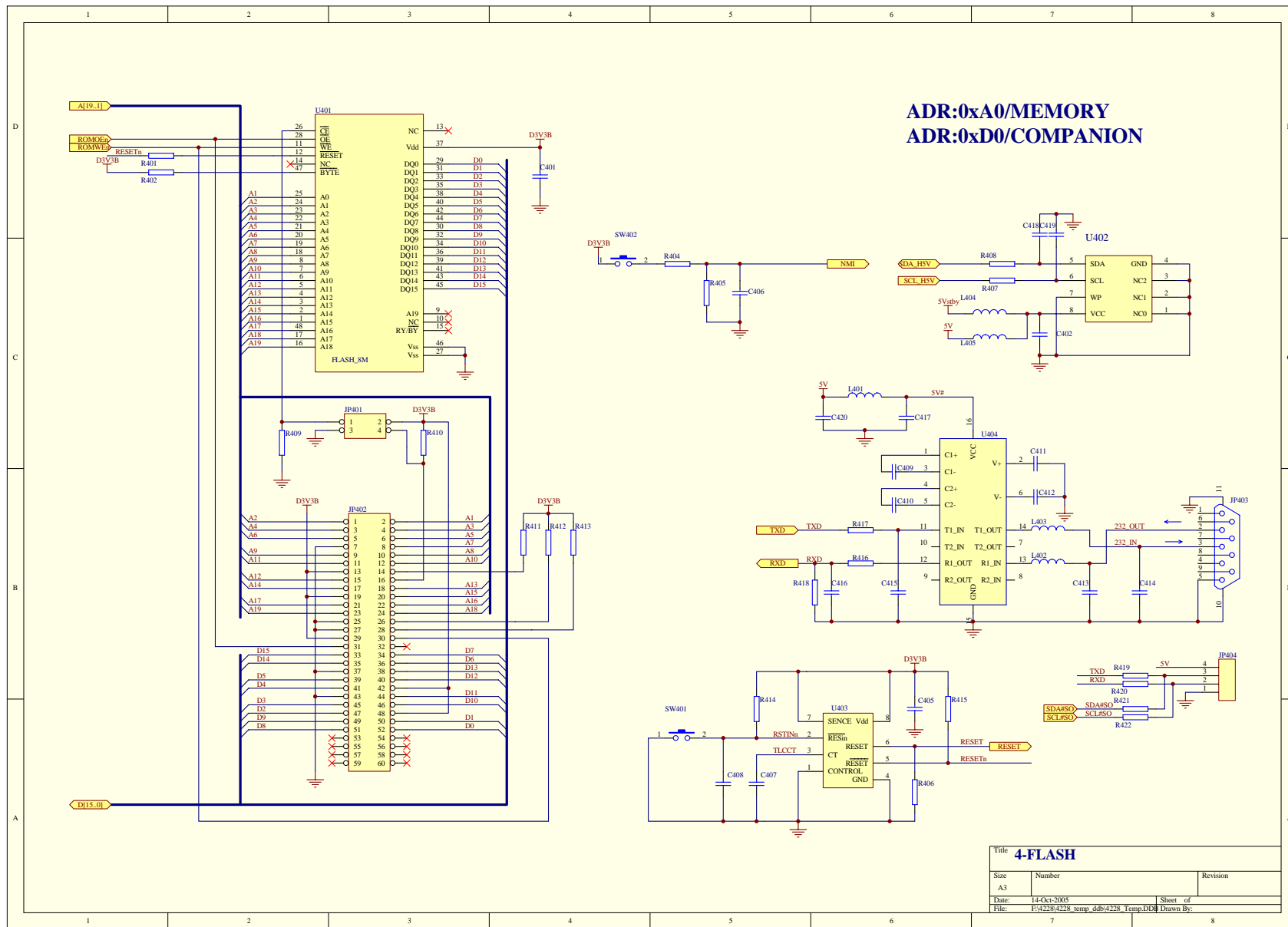




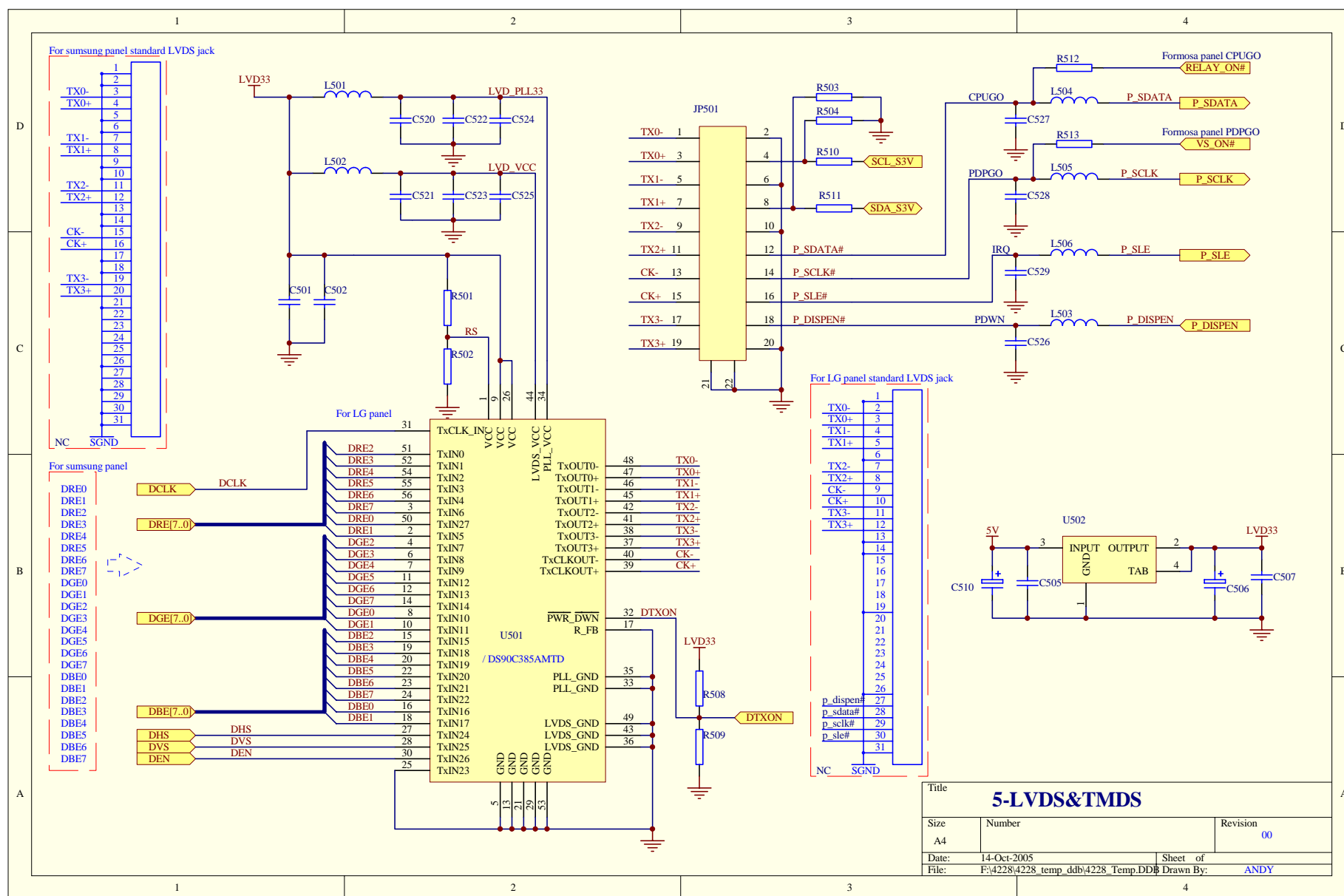


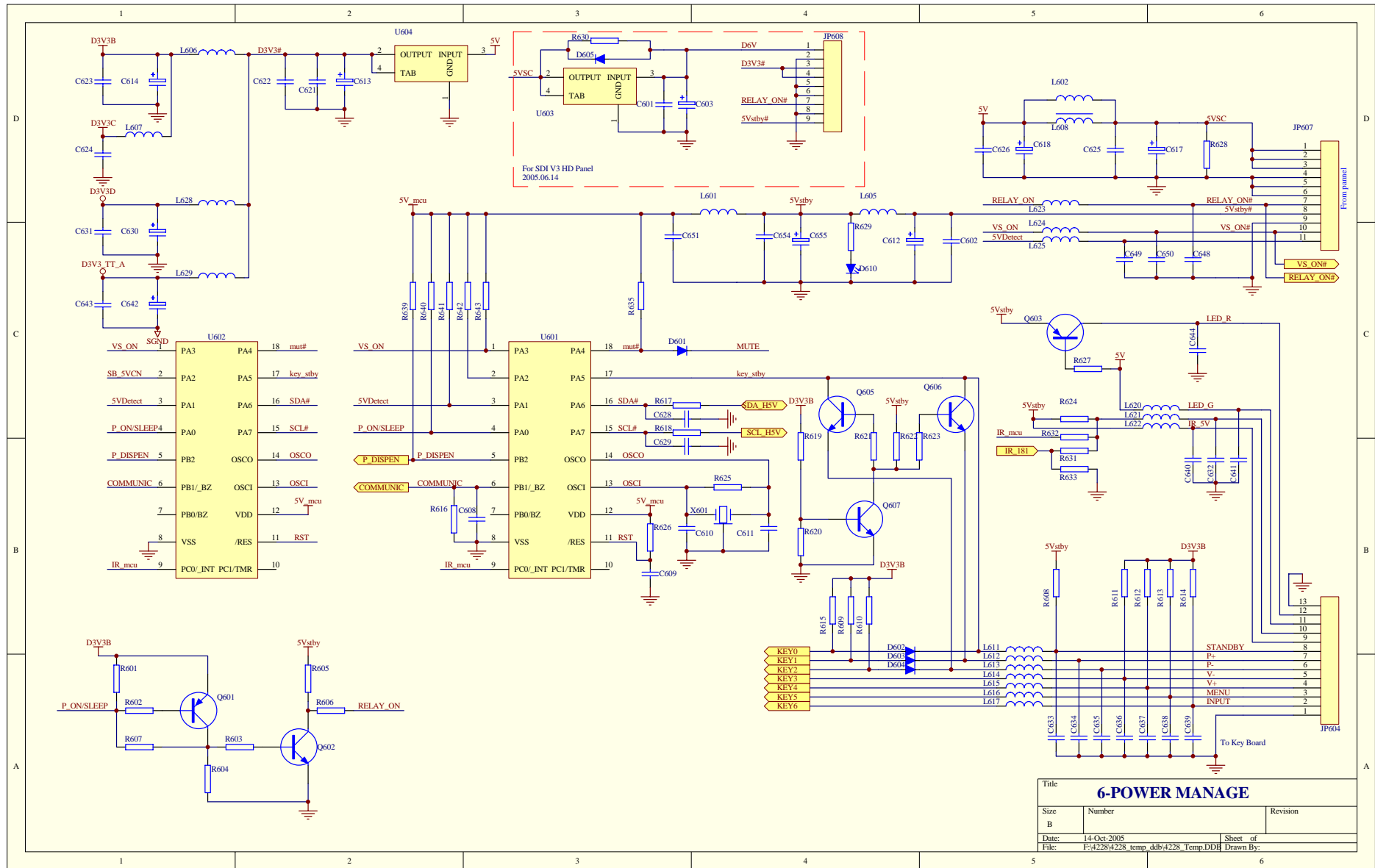




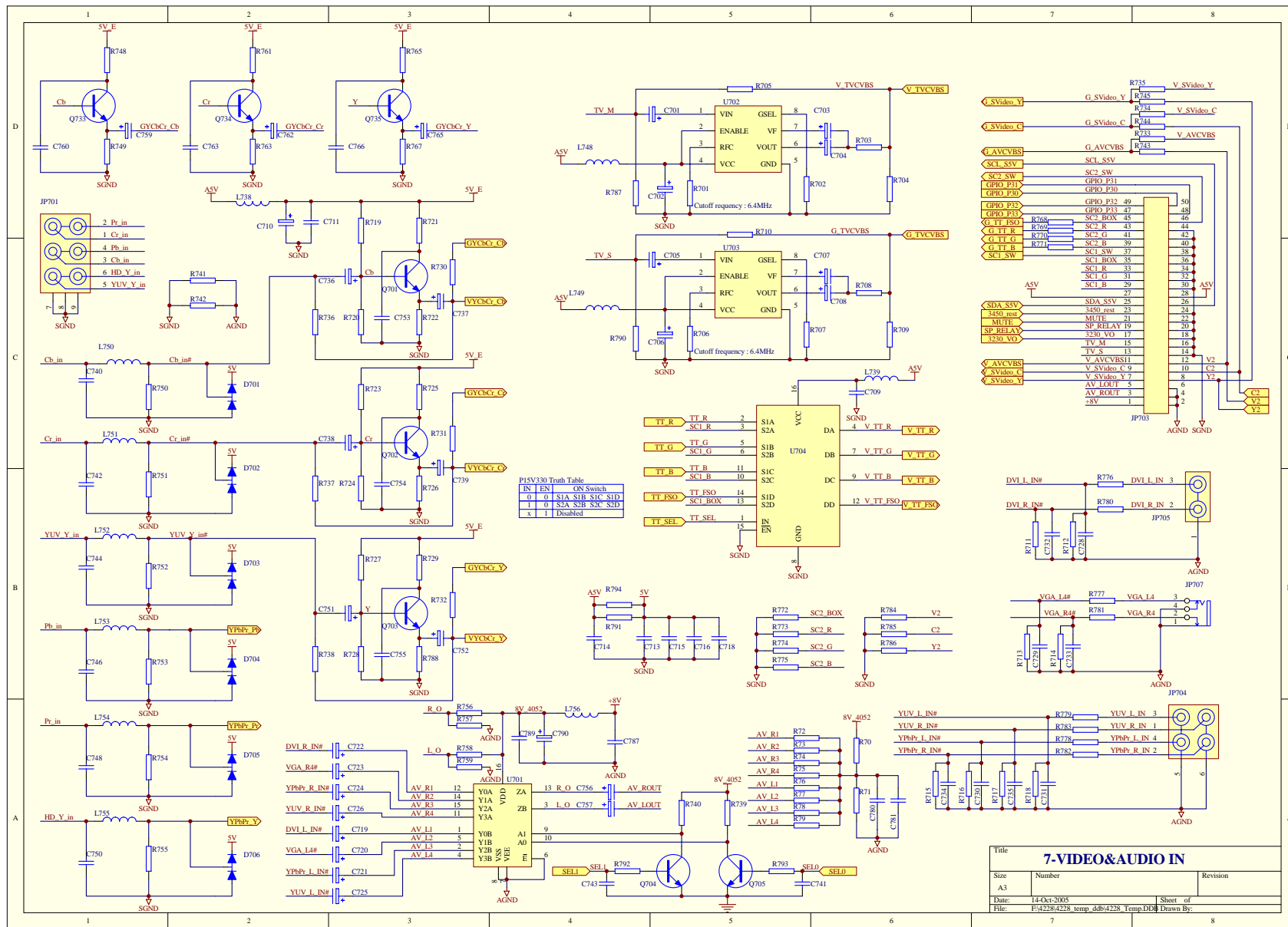


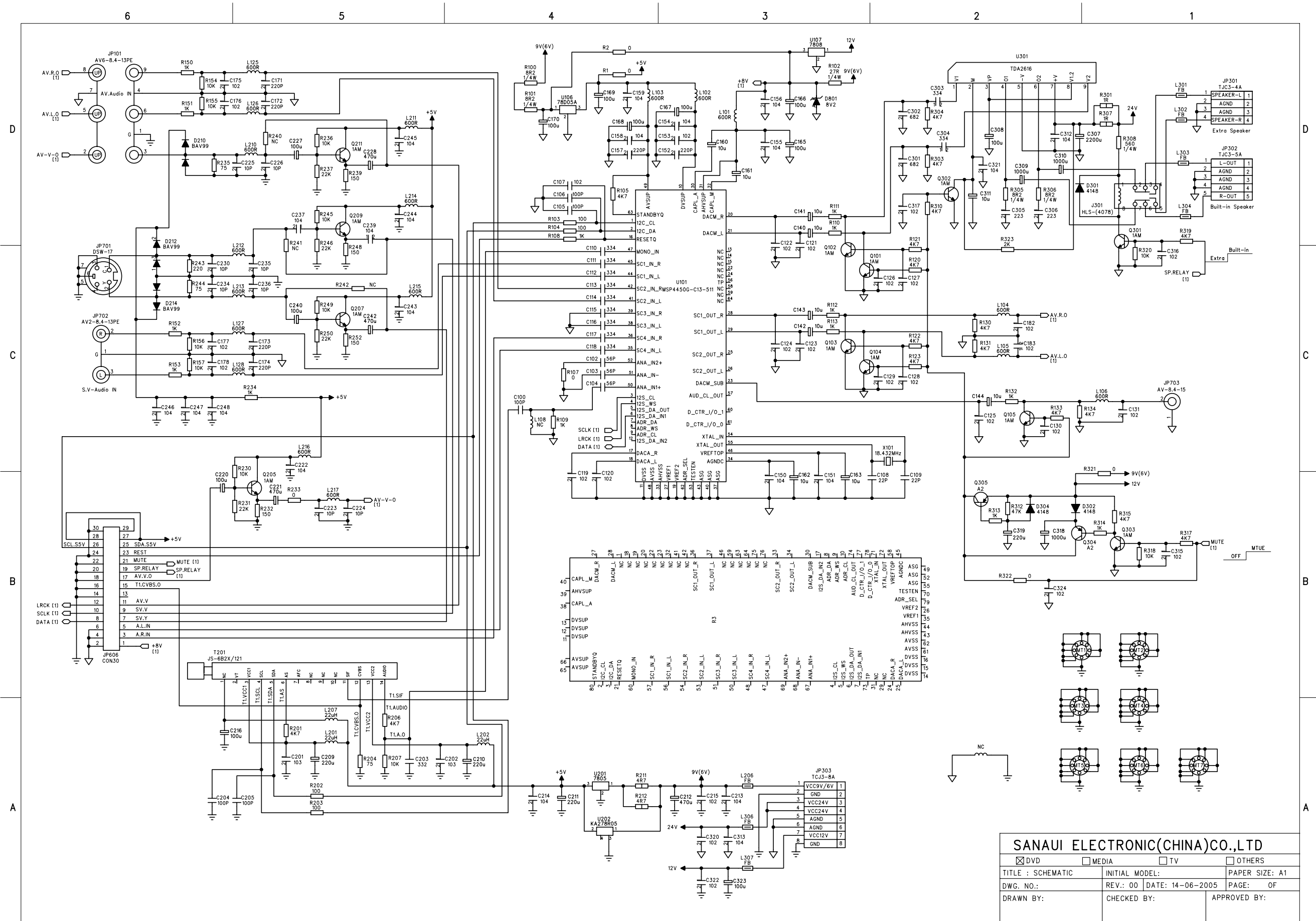




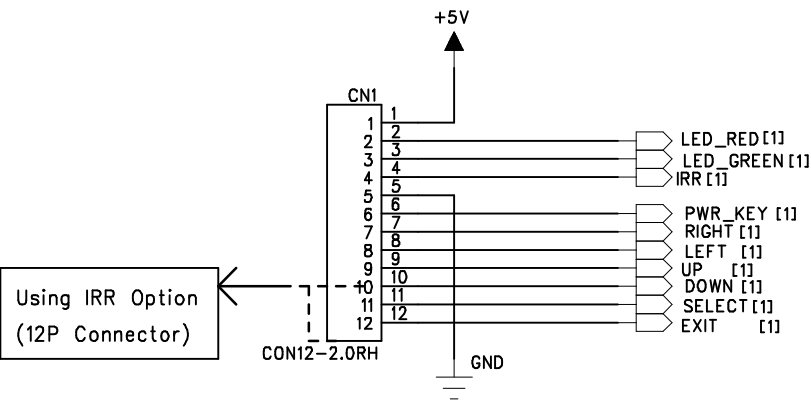


Title		
<b>6-POWER MANAGE</b>		
Size	Number	Revision
B		
Date:	14-Oct-2005	Sheet of
File:	F:\4228\4228_temp.ddb\4228	Temp.DDB Drawn By:

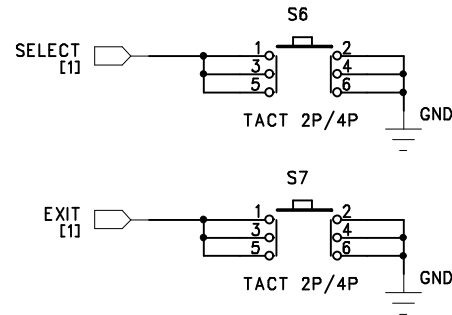
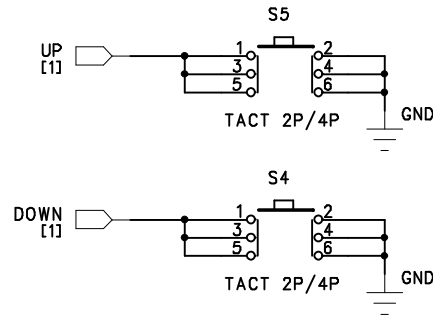
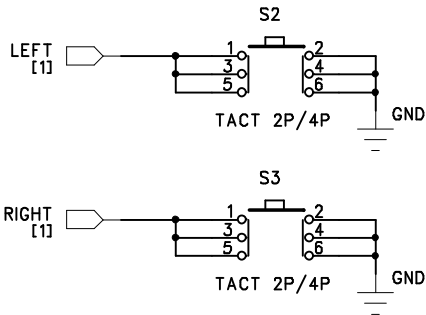
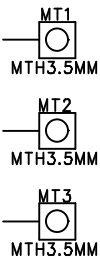
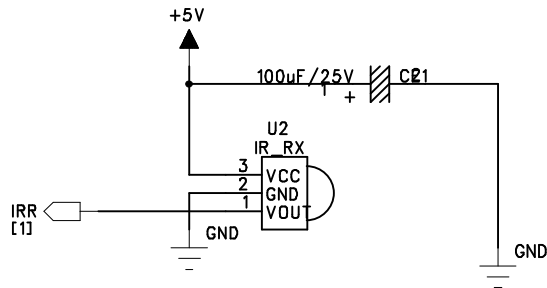
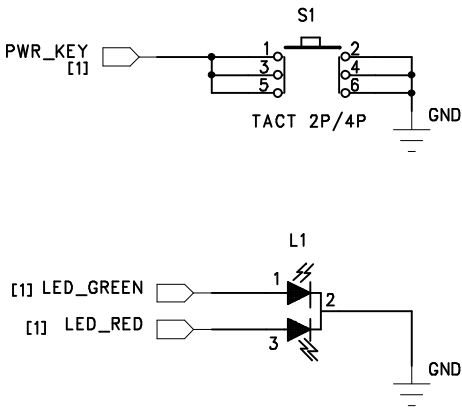




DUBHE OSD  
6-Key OSD

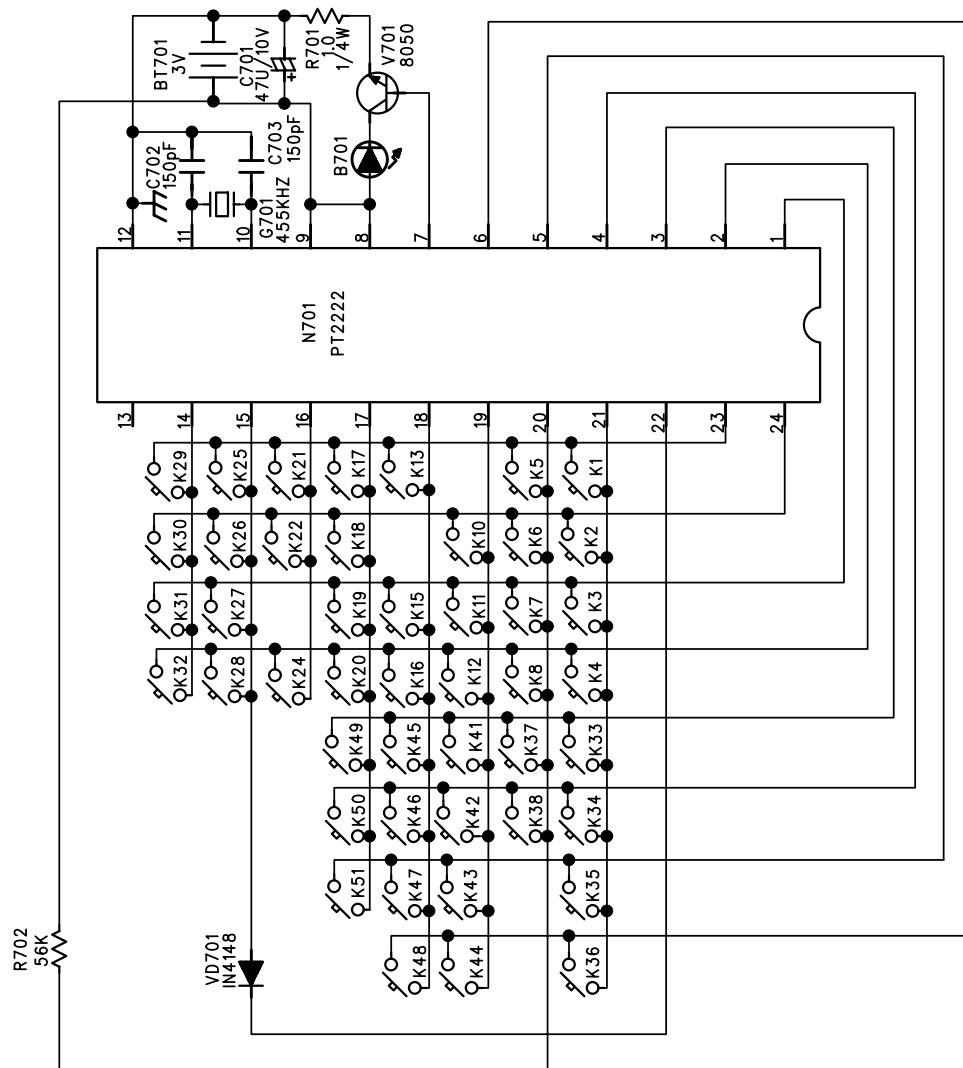


OSD I/F Connector



Project:	Project Name	Rev:	1.2
Title:	DUBHE OSD		
Date:	June. 15,2004	Sheet:	xx of xx

# REMOTE PCB



REMOTE CONTROL CODE ASSIGNMENT

KEY NO.	KEY NAME	DATA CODE	KEY NO.	KEY NAME	DATA CODE
K1	POWER	00	K33	dumb	40
K2	1	01	K34	dumb	41
K3	2	02	K35	dumb	42
K4	3	03	K36	dumb	43
K5	P.MODE	04	K37	MUTE	44
K6	4	05	K38	INFO	45
K7	5	06	K39	nil	46
K8	6	07	K40	nil	47
K9	nil	08	K41	100	48
K10	7	09	K42	PREV	49
K11	8	0A	K43	P.STILL	4A
K12	9	0B	K44	SOUND	4B
K13	MTS	0C	K45	SLEEP	4C
K14	nil	0D	K46	TIME	4D
K15	S.SELE	0E	K47	Picture	4E
K16	OK	0F	K48	CH Erase	4F
K17	CH.+	10	K49	CH Save	50
K18	VOL.+	11	K50	C/C	51
K19	VOL.-	12	K51	V-CHIP	52
K20	CH.-	13	K52	nil	53
K21	MENU	14	K53	nil	54
K22	Source	15	K54	nil	55
K23	nil	16	K55	nil	56
K24	P.SIZE	17	K56	nil	57
K25	0	18	K57	nil	58
K26	F.White	19	K58	nil	59
K27	PIP Source	1A	K59	nil	5A
K28	EXIT	1B	K60	nil	5B
K29	PIP	1C	K61	nil	5C
K30	SWAP	1D	K62	nil	5D
K31	PIP CH-	1E	K63	nil	5E
K32	PIP CH+	1F	K64	nil	5F

CUSTOM CODE: 20DD

FOR NTSC

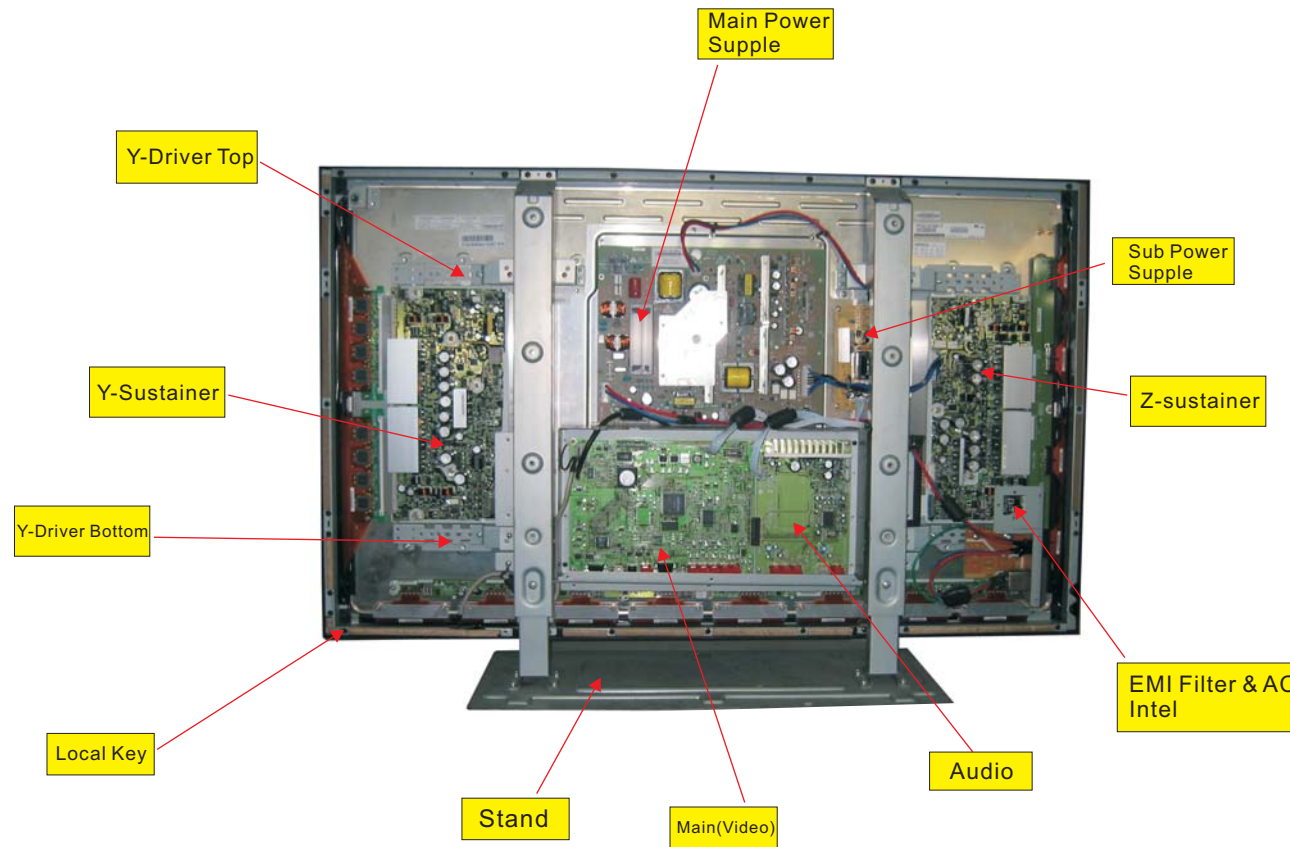
## **Basic Operations & Circuit Description**

### **MODULE**

There are 1 pc. panel and 12 pc.s PCB including 2 pc.s Y/Z Sustainer board, 2 pc.s Y Drive board, 6 pc.s X Extension boards, 1 pc. Control (Signal Input) and 1 pc. Power board in the Module.

### **SET**

There are 6 pc.s PCBs including 1 pc. AUX. PSU Board, 1 pc. Keypad board, 1 pc. Remote Control Receiver board, 1 pc. L/R Speakers and 1 pc. Main (Video) board in the SET.





## **PCB function**

- 1. Power:**
  - (1). Input voltage: AC 100V~120V, 45Hz~60Hz.  
Input range: AC 90V(Min)~265V(Max) auto regulation.**
  - (2). To provide power for PCBs.**
- 2. Main (Video InterFace) board: To converter TV signals, S signals, AV signals, Y Pb/Cb Pr/Cr signals, DVI signals and D-SUB signals to digital ones and to transmit to Control board.**
- 3. Control board: Dealing with the digital signal for output to panel.**
- 4. Y-Sustainer / Z-Sustainer board:**
  - (1). Receiving the signals from Control and high voltage supply.**
  - (2). Output scanning waveform for Module.**
- 5. Y-Drive board: Receive signal from Y sustainer, output horizontal scanning waveform to the panel.**
- 6. X extension board (6pcs): Output addressing signals.**
- 7. Tuner/Audio Board: Process and Amplifying the audio signal to speakers and convert TV RF signal to video/audio signal and send to Main board.**

## **PCB failure analysis**

- 1. CONTROL : a. Abnormal noise on screen. b. No picture.**
- 2. MAIN (video) : a. Lacking color, Bad color scale.  
b. No voice.  
c. No picture but with signals output, OSD and back light.  
d. Abnormal noise on screen.**
- 3. POWER : No picture, no power output.**
- 4. Z - Sustainer : a. No picture.  
b. Color not enough.  
c. Flash on screen.**
- 5. Y - Sustainer : Darker picture with signals.**
- 6. X - Extension : Abormal vertical noise on screen.**
- 7. Audio Board or AUX PSU: a. No voice. (Make sure Mute/OFF) .  
b. Noise.**

## **Basic operation of Plasma Display**

- 1. After turning on power switch, power board sends 5Vst-by Volt to Micro Processor**
- 2. The micro Processor memorize the last state of Power, When the last state of power is on or receive power on signal from local Key or Remote control, Micro Processor will send on control signal to power. Then Power sends (5Vsc, 9Vsc, 24V and RLYON, Vs ON) to PCBs working. This time VIF will send signals to display Image, OSD on the panel and start to search available signal sources. If the audio signals input, them will be amplified by Audio AMP and transmitted to Speakers.**
- 3. If some abnormal signals are detected (for example: over volts, over current, over temperature and under volts), the system will be shut down by Power off.**

## Main IC Specifications

- PW181 Image Processor, Scaler
- PW1231 Digital Video Signal Processor
- VPC 323XD Comb-filter Video Processor
- Z86229 NTSC Line 21 CCD decoder
- MSP34x0G Multistandard Sound Processor
- AD9880 Analog/HDMI Dual Display Interface
- PI5V330 Wideband/Video Quad 2-Channel MUX/DEMUX
- SM5304AV Video Buffer with Built-in Analog LPF
- TDA2616 2 X 12 W hi-fi audio power amplifier with mute
- SAA5360 Multi page intelligent teletext decoder
- AT24C32 Z-Wire Serial EEPROM
- HT48R06A-1 8-Bit Cost-Effective I/O Type MCU

# PW181

## Product Specification



### General Description

The PW181 ImageProcessor is a highly integrated “system-on-a-chip” that interfaces computer graphics and video inputs in virtually any format to a fixed-frequency flat panel display.

Computer and video images from NTSC/PAL to WUXGA at virtually any refresh rate can be resized to fit on a fixed-frequency target display device with any resolution up to WUXGA. Video data from 4:3 aspect ratio NTSC or PAL and 16:9 aspect ratio HDTV or SDTV is supported. Multi-region, nonlinear scaling allows these inputs to be resized optimally for the native resolution of the display.

Advanced scaling techniques are supported, such as format conversion using multiple programmable regions. Three independent image scalers coupled with frame locking circuitry and dual programmable color lookup tables create sharp images in multiple windows, without user intervention.

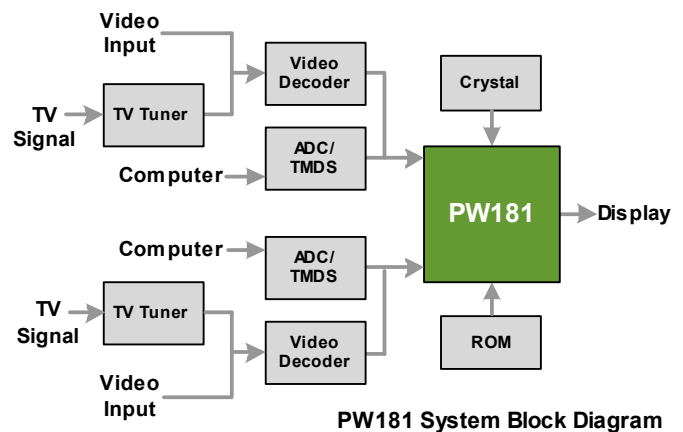
Embedded SDRAM frame buffers and memory controllers perform frame rate conversion and enhanced video processing completely on-chip. A separate memory is dedicated to storage of on-screen display images and CPU general purpose use.

Advanced video processing techniques are supported using the internal frame buffer, including motion adaptive, temporal deinterlacing with film mode detection. When used in combination with the new third-generation scaler, this advanced video processing technology delivers the highest quality video for advanced displays.

Both input ports support integrated DVI 1.0 content protection using standard DVI receivers.

A new advanced OSD Generator with more colors and larger sizes supports more demanding OSD applications, such as on-screen programming guides. When coupled with the new, faster, integrated microprocessor, this OSD Generator supports advanced OSD animation techniques.

Programmable features include the user interface, custom start-up screen, all automatic imaging features, and special screen effects.



### Features

- Third-generation, two-dimensional filtering techniques
- Third-generation, advanced scaling techniques
- Second-generation Automatic Image Optimization
- Frame rate conversion
- Video processing
- On-Screen Display (OSD)
- On-chip microprocessor
- JTAG debugger and boundary scan
- Picture-in-picture (PIP)
- Multi-region, non-linear scaling
- Hardware 2-wire serial bus support

### Applications

- Multimedia Displays
- Plasma Displays
- Digital Television

Device	Application	Package
PW181-10V	Up to XGA Displays	352 PBGA
PW181-20V	Up to UXGA Displays	



8100 SW Nyberg Road  
Tualatin, OR 97062 USA  
Telephone: 503.454.1750  
FAX: 503.612.0848  
www.pixelworks.com

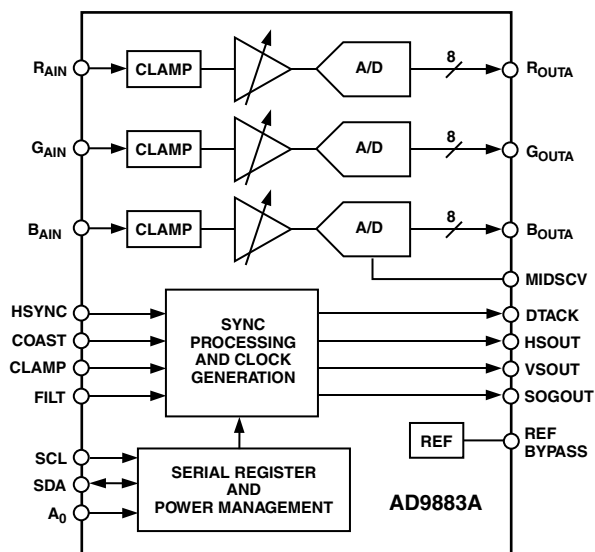
### FEATURES

**140 MSPS Maximum Conversion Rate**  
**300 MHz Analog Bandwidth**  
**0.5 V to 1.0 V Analog Input Range**  
**500 ps p-p PLL Clock Jitter at 110 MSPS**  
**3.3 V Power Supply**  
**Full Sync Processing**  
**Sync Detect for "Hot Plugging"**  
**Midscale Clamping**  
**Power-Down Mode**  
**Low Power: 500 mW Typical**  
**4:2:2 Output Format Mode**

### APPLICATIONS

**RGB Graphics Processing**  
**LCD Monitors and Projectors**  
**Plasma Display Panels**  
**Scan Converters**  
**Microdisplays**  
**Digital TV**

### FUNCTIONAL BLOCK DIAGRAM



### GENERAL DESCRIPTION

The AD9883A is a complete 8-bit, 140 MSPS monolithic analog interface optimized for capturing RGB graphics signals from personal computers and workstations. Its 140 MSPS encode rate capability and full power analog bandwidth of 300 MHz supports resolutions up to SXGA (1280 × 1024 at 75 Hz).

The AD9883A includes a 140 MHz triple ADC with internal 1.25 V reference, a PLL, and programmable gain, offset, and clamp control. The user provides only a 3.3 V power supply, analog input, and Hsync and COAST signals. Three-state CMOS outputs may be powered from 2.5 V to 3.3 V.

The AD9883A's on-chip PLL generates a pixel clock from the Hsync input. Pixel clock output frequencies range from 12 MHz to

140 MHz. PLL clock jitter is 500 ps p-p typical at 140 MSPS. When the COAST signal is presented, the PLL maintains its output frequency in the absence of Hsync. A sampling phase adjustment is provided. Data, Hsync, and clock output phase relationships are maintained. The AD9883A also offers full sync processing for composite sync and sync-on-green applications.

A clamp signal is generated internally or may be provided by the user through the CLAMP input pin. This interface is fully programmable via a 2-wire serial interface.

Fabricated in an advanced CMOS process, the AD9883A is provided in a space-saving 80-lead LQFP surface-mount plastic package and is specified over the 0°C to 70°C temperature range.

REV. A

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**One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106, U.S.A.**  
**Tel:**  
**Fax:**

# PW1231A

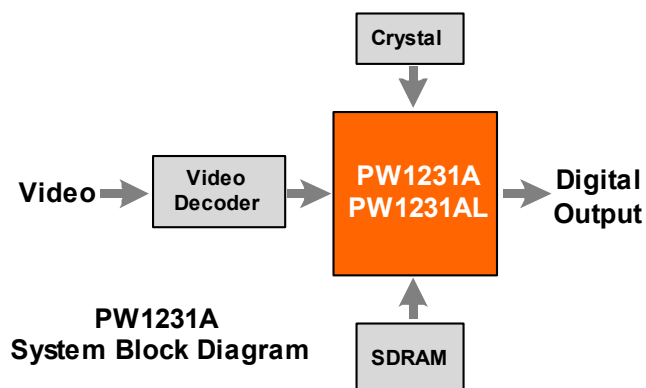
## Product Specification



### General

The PW1231A is a high-quality, digital video signal processor that incorporates Pixelworks' patented deinterlacing, scaling, and video enhancement algorithms. The PW1231A accepts industry-standard video formats and resolutions, and converts the input into many desired output formats. The highly efficient video algorithms result in excellent quality video.

The PW1231A combines many functions into a single device, including a memory controller, auto-configuration, and others. This high level of integration enables simple, flexible, cost-effective solutions that require fewer components.



### Features

- Built-In Memory Controller
- Motion-Adaptive Deinterlace Processor
- Intelligent Edge Deinterlacing
- Digital Color/Luminance Transient Improvement (DCTI/DLTI)
- Interlaced Video Input Options, including NTSC and PAL
- Independent horizontal and vertical scaling
- Copy Protection
- Two-Wire Serial Interface

### Applications: For use with Digital Displays

- Flat-Panel (LCD, DLP) TVs
- Rear Projection TVs
- Plasma Displays
- LCD Multimedia Monitors
- Multimedia Projectors

Device	Application	Package
PW1231A PW1231AL	Up to XGA	160-pin PQF

NOTE: "L" denotes lead (Pb) free



8100 SW Nyberg Road  
Tualatin, OR 97062 USA  
Telephone: 503.612.6700  
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[www.pixelworks.com](http://www.pixelworks.com)

P/N 001-0097-00 Rev B  
July 2003

**PRELIMINARY—CONFIDENTIAL**

### FEATURES

- Analog/HDMI Dual Interface
- Supports High-Bandwidth Digital Content Protection
- RGB to YCbCr two-way color conversion
- Automated clamping level adjustment
- 1.8/3.3V Power Supply
- 100-pin LQFP Pb-Free Package
- RGB and YCbCr Output Formats

### Analog Interface

- 8-bit Triple Analog to Digital Converters
- 150 MSPS Maximum Conversion Rate
- Macrovision Detection
- 2:1 Input Mux
- Full Sync Processing
- Sync Detect for "Hot Plugging"
- Mid-Scale Clamping

### Digital Video Interface

- HDMI 1.0, DVI 1.0
- 150 MHz HDMI Receiver
- Supports High-Bandwidth Digital Content Protection (HDCP 1.1)

### Digital Audio Interface

- HDMI 1.0 compatible audio interface
- S/PDIF (IEC90658 compatible) digital audio output
- Multi-channel I<sup>2</sup>S audio output (up to 8 channels)

### APPLICATIONS

- Advanced TV
- HDTV
- Projectors
- LCD Monitor

### GENERAL DESCRIPTION

The AD9880 offers designers the flexibility of an analog interface and High-Definition Multimedia Interface (HDMI) receiver integrated on a single chip. Also included is support for High bandwidth Digital Content Protection (HDCP).

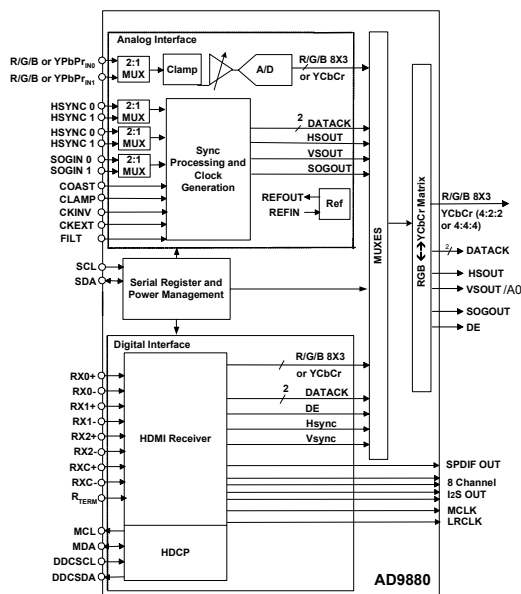
#### Analog Interface

The AD9880 is a complete 8-bit 150 MSPS monolithic analog interface optimized for capturing Component Video (YPbPr) and RGB graphics signals. Its 150 MSPS encode rate capability and full power analog bandwidth of 300 MHz supports all HDTV formats (up to 1080p) and FPD resolutions up to SXGA (1280 x 1024 at 75 Hz).

The analog interface includes a 150 MHz triple ADC with internal 1.25V reference, a Phase Locked Loop (PLL), and programmable gain, offset, and clamp control. The user provides only 1.8V and 3.3V power supply, analog input, and Hsync. Three-state CMOS outputs may be powered from 1.8V to 3.3V.

The AD9880's on-chip PLL generates a pixel clock from Hsync. Pixel clock output frequencies range from 12 MHz to 150 MHz.

### FUNCTIONAL BLOCK DIAGRAM



PLL clock jitter is typically less than 500 ps p-p at 150 MHz. The AD9880 also offers full sync processing for composite sync and Sync-on-Green (SOG) applications.

#### Digital Interface

The AD9880 contains a HDMI 1.0 compatible receiver and supports all HDTV formats (up to 1080p) and display resolutions up to SXGA (1280 x 1024 at 75 Hz). The receiver features an intra-pair skew tolerance of up to one full clock cycle. With the inclusion of HDCP, displays may now receive encrypted video content. The AD9880 allows for authentication of a video receiver, decryption of encoded data at the receiver, and renewability of that authentication during transmission as specified by the HDCP 1.1 protocol.

Fabricated in an advanced CMOS process, the AD9880 is provided in a space-saving 100-lead LQFP surface-mount plastic package and is specified over the 0 °C to 70 °C temperature range.

### AD9880 Preliminary Technical Information

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## Comb Filter Video Processor

### 1. Introduction

The VPC 323xD is a high-quality, single-chip video front-end, which is targeted for 4:3 and 16:9, 50/60-Hz and 100/120 Hz TV sets. It can be combined with other members of the DIGIT3000 IC family (such as DDP 331x) and/or it can be used with 3rd-party products.

The main features of the VPC 323xD are

- high-performance adaptive 4H comb filter Y/C separator with adjustable vertical peaking
- multi-standard color decoder PAL/NTSC/SECAM including all substandards
- four CVBS, one S-VHS input, one CVBS output
- two RGB/YC<sub>r</sub>C<sub>b</sub> component inputs, one Fast Blank (FB) input
- integrated high-quality A/D converters and associated clamp and AGC circuits
- multi-standard sync processing
- linear horizontal scaling (0.25 ... 4), as well as non-linear horizontal scaling 'Panoramavision'
- PAL+ preprocessing
- line-locked clock, data and sync, or 656-output interface
- peaking, contrast, brightness, color saturation and tint for RGB/YC<sub>r</sub>C<sub>b</sub> and CVBS/S-VHS
- high-quality soft mixer controlled by Fast Blank
- PIP processing for four picture sizes ( $\frac{1}{4}$ ,  $\frac{1}{9}$ ,  $\frac{1}{16}$ , or  $\frac{1}{36}$  of normal size) with 8-bit resolution
- 15 predefined PIP display configurations and expert mode (fully programmable)
- control interface for external field memory
- I<sup>2</sup>C-bus interface
- one 20.25-MHz crystal, few external components
- 80-pin PQFP package

#### 1.1. System Architecture

Fig.1–1 shows the block diagram of the video processor

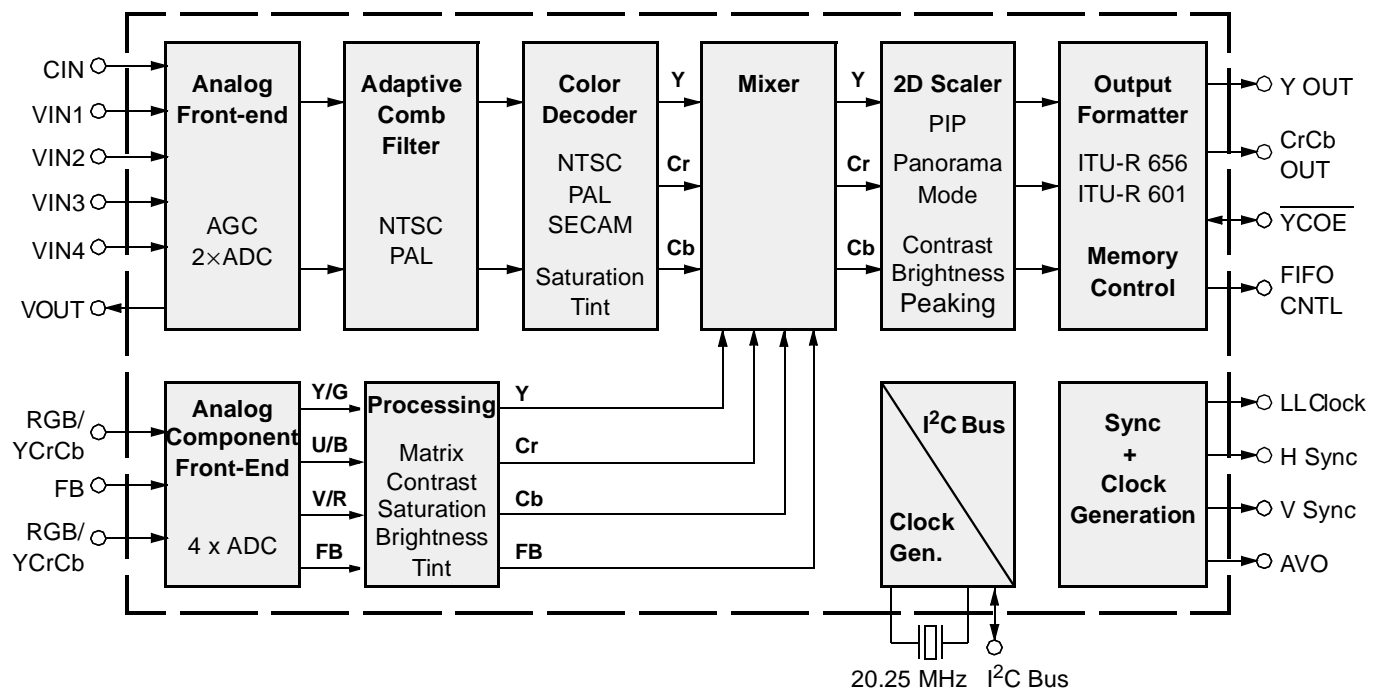


Fig. 1–1: Block diagram of the VPC 323xD



## Z86229

### NTSC LINE 21 CCD DECODER

#### FEATURES

Devices	Speed (MHz)	Pin Count/ Package Types	Standard Temp. Range	On-Screen Display & Closed Captioning	Automatic Data Extraction	
					Program Rating	Time of Day
Z86229	12	18-Pin DIP, SOIC	0°C to +70°C	Yes	Yes	Yes

- Complete Stand-Alone Line 21 Decoder for Closed-Captioned and Extended Data Services (XDS)
- Preprogrammed to Provide Full Compliance with EIA-608 Specifications for Extended Data Services
- Automatic Extraction and Serial Output of Special XDS Packets (Time of Day, Local Time Zone, and Program Blocking)
- Programmable XDS Filter for a Specific XDS Packet
- Cost-Effective Solution for NTSC Violence Blocking inside Picture-in-Picture (PiP) Windows
- Minimal Communications and Control Overhead Provide Simple Implementation of Violence Blocking, Closed Captioning, and Auto Clock Set Features
- Programmable, On-Screen Display (OSD) for Creating Full Screen OSD or Captions inside a Picture-in-Picture (PiP) Window
- User-Programmable Horizontal Display Position for easy OSD Centering and Adjustment
- I<sup>2</sup>C Serial Data and Control Communication
- Supports 2 Selectable I<sup>2</sup>C Addresses

#### GENERAL DESCRIPTION

Capable of processing Vertical Blanking Interval (VBI) data from both fields of the video frame in data, the Z86229 Line 21 Decoder offers a feature-rich solution for any television or set-top application. The robust nature of the Z86229 helps the device conform to the transmission format defined in the Television Decoder Circuits Act of 1990, and in accordance with the Electronics Industry Association specification 608 (EIA-608).

The Line 21 data stream can consist of data from several data channels multiplexed together. Field 1 consists of four data channels: two Captions and two Texts. Field 2 consists of five additional data channels: two Captions, two Texts, and Extended Data Services (XDS). The XDS data structure is

defined in EIA-608. The Z86229 can recover and display data transmitted on any of these nine data channels.

The Z86229 can recover and output to a host processor via the I<sup>2</sup>C serial bus. The recovered XDS data packet is further defined in the EIA-608 specification. The on-chip XDS filters in the Z86229 are fully programmable, enabling recovery of only those XDS data packets selected by the user. This functionality allows the device to extract the required XDS information with proper XDS filter setup for compatibility in a variety of TVs, VCRs, and Set-Top boxes.

In addition, the Z86229 is ideally suited to monitor Line 21 video displayed in a PiP window for violence blocking, CCD, and other XDS data services. A block diagram of the Z86229 is illustrated in Figure 1.

## Multistandard Sound Processor Family

**Release Note:** Revision bars indicate significant changes to the previous edition. The hardware and software description in this document is valid for the MSP 34x0G version B8 and following versions.

### 1. Introduction

The MSP 34x0G family of single-chip Multistandard Sound Processors covers the sound processing of all analog TV-Standards worldwide, as well as the NICAM digital sound standards. The full TV sound processing, starting with analog sound IF signal-in, down to processed analog AF-out, is performed on a single chip. Figure 1–1 shows a simplified functional block diagram of the MSP 34x0G.

This new generation of TV sound processing ICs now includes versions for processing the multichannel television sound (MTS) signal conforming to the standard recommended by the Broadcast Television Systems Committee (BTSC). The DBX noise reduction, or alternatively, Micronas Noise Reduction (MNR) is performed alignment free.

Other processed standards are the Japanese FM-FM multiplex standard (EIA-J) and the FM Stereo Radio standard.

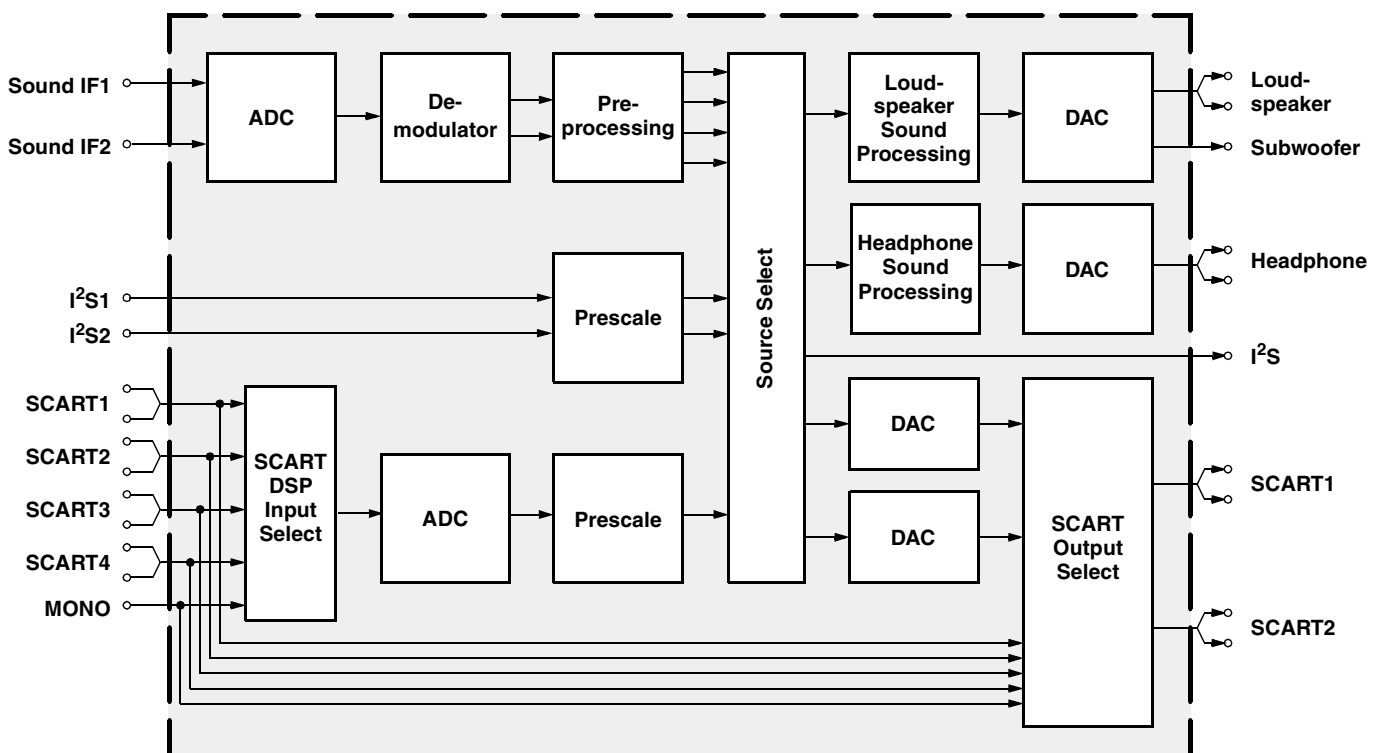
Current ICs have to perform adjustment procedures in order to achieve good stereo separation for BTSC and EIA-J. The MSP 34x0G has optimum stereo performance without any adjustments.

All MSP 34xxG versions are pin compatible to the MSP 34xxD. Only minor modifications are necessary to adapt a MSP 34xxD controlling software to the MSP 34xxG. The MSP 34x0G further simplifies controlling software. Standard selection requires a single I<sup>2</sup>C transmission only.

The MSP 34x0G has built-in automatic functions: The IC is able to detect the actual sound standard automatically (Automatic Standard Detection). Furthermore, pilot levels and identification signals can be evaluated internally with subsequent switching between mono/stereo/bilingual; no I<sup>2</sup>C interaction is necessary (Automatic Sound Selection).

The MSP 34x0G can handle very high FM deviations even in conjunction with NICAM processing. This is especially important for the introduction of NICAM in China.

The ICs are produced in submicron CMOS technology. The MSP 34x0G is available in the following packages: PLCC68 (not intended for new design), PSDIP64, PSDIP52, PQFP80, and PLQFP64.



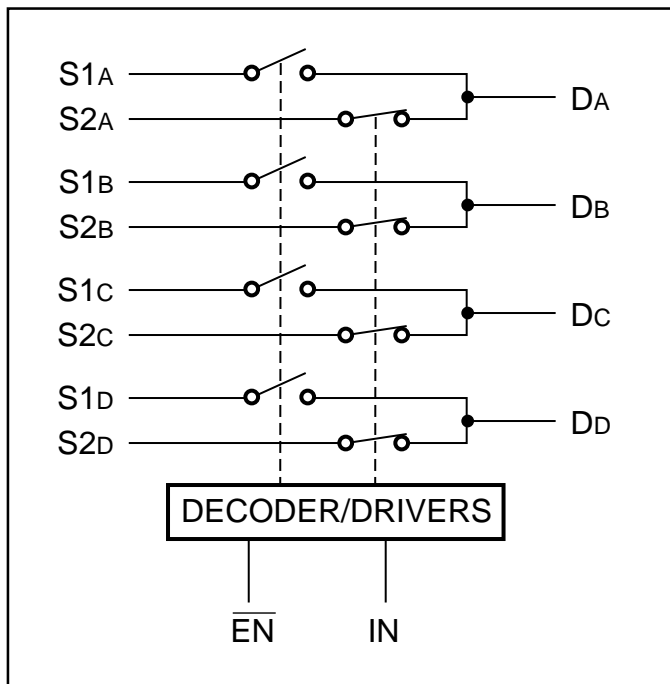
**Fig. 1–1:** Simplified functional block diagram of the MSP 34x0G

## Low ON Resistance Wideband/Video Quad 2-Channel MUX/DEMUX

### Product Features:

- High-performance, low-cost solution to switch between video sources
- Wide bandwidth: 200 MHz
- Low ON-resistance:  $3\Omega$
- Low crosstalk at 10 MHz:  $-58$  dB
- Ultra-low quiescent power ( $0.1 \mu\text{A}$  typical)
- Single supply operation:  $+5.0\text{V}$
- Fast switching: 10 ns
- High-current output: 100 mA
- Packages available:
  - 16-pin 300-mil wide plastic SOIC (S)
  - 16-pin 150-mil wide plastic SOIC (W)
  - 16-pin 150-mil wide plastic QSOP (Q)

### Functional Block Diagram



### Truth Table

$\overline{\text{EN}}$	IN	ON Switch
0	0	S1A, S1B, S1C, S1D
0	1	S2A, S2B, S2C, S2D
1	X	Disabled

### Product Description:

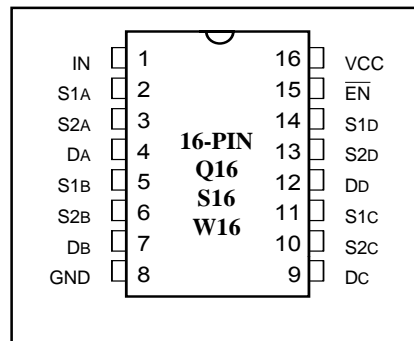
Pericom Semiconductor's PI5V series of mixed signal video circuits are produced in the Company's advanced CMOS low-power technology, achieving industry leading performance.

The PI5V330 is a true bidirectional Quad 2-channel multiplexer/demultiplexer that is recommended for both RGB and composite video switching applications. The VideoSwitch™ can be driven from a current output RAMDAC or voltage output composite video source.

Low ON-resistance and wide bandwidth make it ideal for video and other applications. Also this device has exceptionally high current capability which is far greater than most analog switches offered today. A single 5V supply is all that is required for operation.

The PI5V330 offers a high-performance, low-cost solution to switch between video sources. The application section describes the PI5V330 replacing the HC4053 multiplier and buffer/amplifier.

### 16-Pin Product Configuration



### Product Pin Description

Pin Name	Description
S1A, S2A S1B, S2B S1C, S2C S1D, S2D	Analog Video I/O
IN	Select Input
$\overline{\text{EN}}$	Enable
DA, DB, DC, DD	Analog Video I/O
GND	Ground
VCC	Power

## OVERVIEW

The SM5304AV is a  $75\Omega$  terminating resistance drive video buffer with built-in analog filter. The filter cutoff frequency, controlled by the resistance connected to RFC pin, can be set to match any system resolution. The output buffer can be selected 0dB, 6dB, and 12dB. The feedback point occurs after the external coupling capacitors, and the coupling capacitances can be reduced.

## FEATURES

- $5V \pm 10\%$  supply voltage
- Adjustable cutoff frequency using external resistor
- 0dB, 6dB, 12dB selectable gain using logic signal
- $\pm 0.5\text{dB}$  output gain error
- Two systems (two load resistances) can be driven
- 0.7% output signal harmonic distortion
- Sag compensation circuit built-in
- Package: 8-pin VSOP (Pb free)

## APPLICATIONS

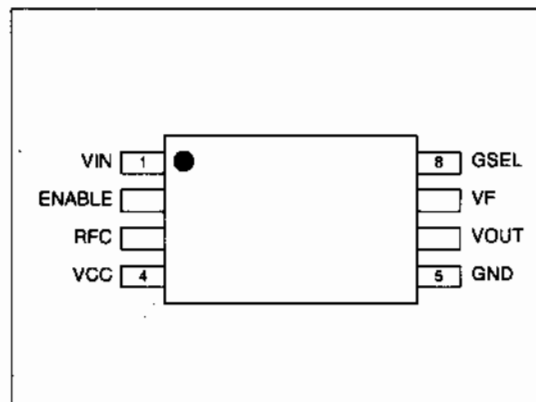
- DVD
- Digital still camera
- Digital VHS

## ORDERING INFORMATION

Device	Package
SM5304AV	8-pin VSOP

## PINOUT

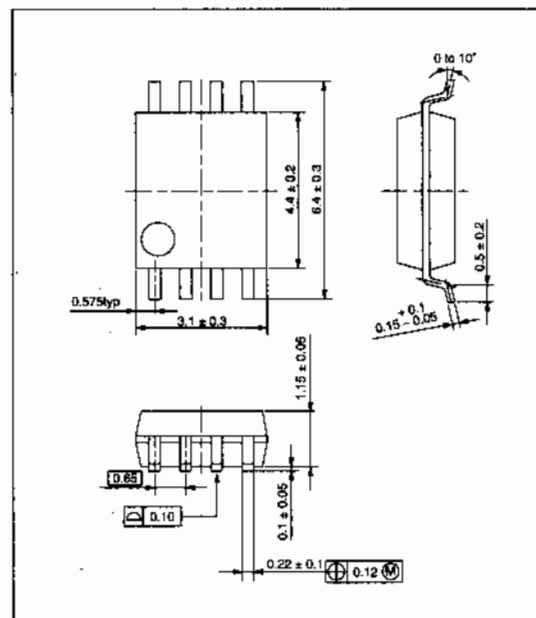
(Top view)

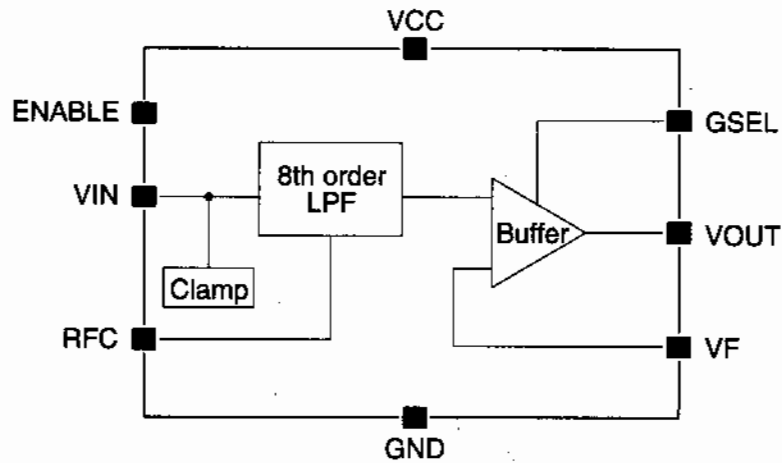


## PACKAGE DIMENSIONS

(Unit: mm)

Weight: 0.04g



**BLOCK DIAGRAM****PIN DESCRIPTION**

Number	Name	I/O <sup>1</sup>	A/D <sup>2</sup>	Description
1	VIN	I	A	Input signal pin
2	ENABLE	I	D	Enable signal input pin (with pull-down resistor)
3	RFC	O	A	LPF cutoff frequency set pin
4	VCC	—	—	5V supply pin
5	GND	—	—	Ground pin
6	VOUT	O	A	Output signal pin
7	VF	I	A	Output signal feedback pin for sag compensation circuit
8	GSEL	I	D	Gain set signal input pin

1. I: input, O: output  
 2. A: analog, D: digital

## 2 x 12 W hi-fi audio power amplifiers with mute

## TDA2616/TDA2616Q

### FEATURES

- Requires very few external components
- No switch-on/switch-off clicks
- Input mute during switch-on and switch-off
- Low offset voltage between output and ground
- Excellent gain balance of both amplifiers
- Hi-fi in accordance with IEC 268 and DIN 45500
- Short-circuit proof and thermal protected
- Mute possibility.

### GENERAL DESCRIPTION

The TDA2616 and TDA2616Q are dual power amplifiers. The TDA2616 is supplied in a 9-lead single-in-line (SIL9) plastic power package (SOT131), while the TDA2616Q is supplied in a 9-lead SIL-bent-to-DIL plastic power package (SOT157). They have been especially designed for mains fed applications, such as stereo radio and stereo TV.

### QUICK REFERENCE DATA

Stereo application

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$\pm V_P$	supply voltage range		7.5	–	21	V
$P_O$	output power	$V_P = \pm 16$ V; THD = 0.5%	–	12	–	W
$G_V$	internal voltage gain		–	30	–	dB
$ G_V $	channel unbalance		–	0.2	–	dB
$\alpha$	channel separation		–	70	–	dB
SVRR	supply voltage ripple rejection		–	60	–	dB
$V_{no}$	noise output voltage		–	70	–	$\mu$ V

### ORDERING INFORMATION

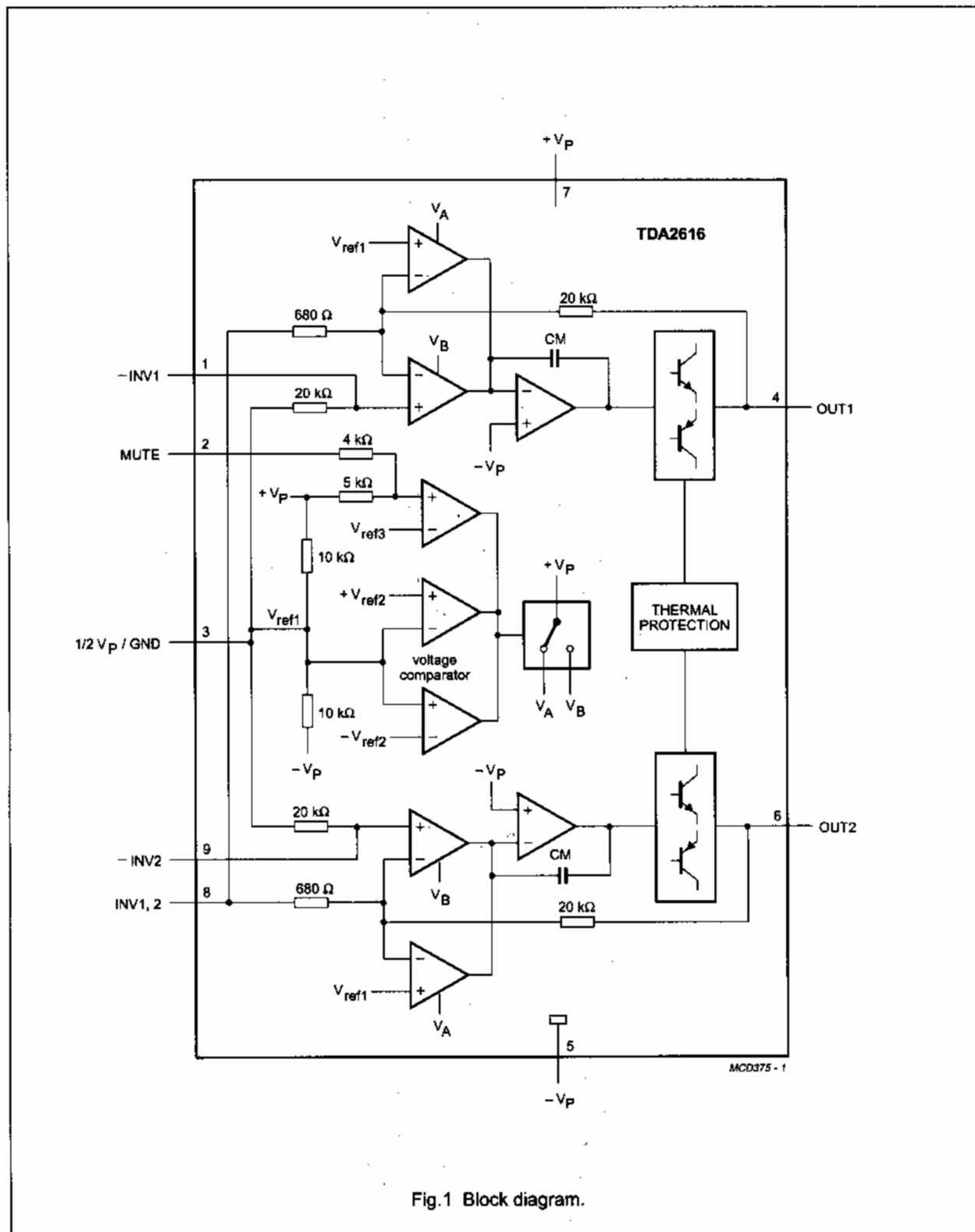
EXTENDED TYPE NUMBER	PACKAGE			
	PINS	PIN POSITION	MATERIAL	CODE
TDA2616	9	SIL	plastic	SOT131 <sup>(1)</sup>
TDA2616Q	9	SIL-bent-to-DIL	plastic	SOT157 <sup>(2)</sup>

### Notes

1. SOT131-2; 1996 August 27.
2. SOT157-2; 1996 August 27.

# 2 x 12 W hi-fi audio power amplifiers with mute

TDA2616/TDA2616Q





## Multi page intelligent teletext decoder

## SAA5360; SAA5361

## 1 FEATURES

- Support for 50 or 60 and 100 or 120 Hz and progressive scan display modes
- Complete 625 line teletext decoder in one chip reduces printed-circuit board area and cost
- Automatic detection of transmitted fasttext links or service information (packet 8/30)
- On-Screen Display (OSD) for user interface menus using teletext and dedicated menu icons
- Video Programming System (VPS) decoding
- Wide Screen Signalling (WSS) decoding
- Pan-European, Cyrillic, Greek, Turkish, Arabic and Iranian character sets in each chip
- High-level command interface via I<sup>2</sup>C-bus gives easy control with a low software overhead
- High-level command interface is backward compatible to Stand-Alone Fasttext And Remote Interface (SAFARI)
- 625 and 525 line display
- RGB interface to standard colour decoder ICs; current source
- Versatile 8-bit open-drain Input/Output (I/O) expander; 5 V tolerant
- Single 12 MHz crystal oscillator
- Single power supply: from 3.0 V to 3.6 V
- Operating temperature: -20 to +70 °C
- Automatic detection of transmitted pages to be selected by page up and page down



- 8 page fasttext decoder
- Table Of Pages (TOP) decoder with Basic Top Table (BTT) and Additional Information Tables (AITs)
- 4 page user-defined list mode.

## 2 GENERAL DESCRIPTION

The SAA5360; SAA5361 is a single-chip multi page 625 line world system teletext decoder with a high-level command interface, and is SAFARI compatible.

The device is designed to minimize the overall system cost, due to the high-level command interface offering the benefit of a low software overhead in the TV microcontroller.

The SAA5360 incorporates the following functions:

- 10 page teletext decoder with OSD, fasttext, TOP, default and list acquisition modes
- Automatic channel installation support.

The functionality of the SAA5361 is similar to the SAA5360, but offers the capability to store up to 250 additional pages of teletext in an external SRAM.

## 3 QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V <sub>DD</sub>	all supply voltages	referenced to V <sub>SS</sub>	3.0	3.3	3.6	V
I <sub>DDP</sub>	periphery supply current	note 1	1	—	—	mA
I <sub>DDC</sub>	core supply current	normal mode	—	15	18	mA
		idle mode	—	4.6	6	mA
I <sub>DDA</sub>	analog supply current	normal mode	—	45	48	mA
		idle mode	—	0.87	1	mA
f <sub>xal(nom)</sub>	nominal crystal frequency	fundamental mode	—	12	—	MHz
T <sub>amb</sub>	ambient temperature		-20	—	+70	°C
T <sub>stg</sub>	storage temperature		-55	—	+125	°C

## Note

1. Periphery supply current is dependent on external components and I/O voltage levels.

## Multi page intelligent teletext decoder

SAA5360; SAA5361

## 4 ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
SAA5360HL	LQFP100	plastic low profile quad flat package; 100 leads; body 14 × 14 × 1.4 mm	SOT407-1
SAA5361HL	LQFP100	plastic low profile quad flat package; 100 leads; body 14 × 14 × 1.4 mm	SOT407-1

## 5 BLOCK DIAGRAM

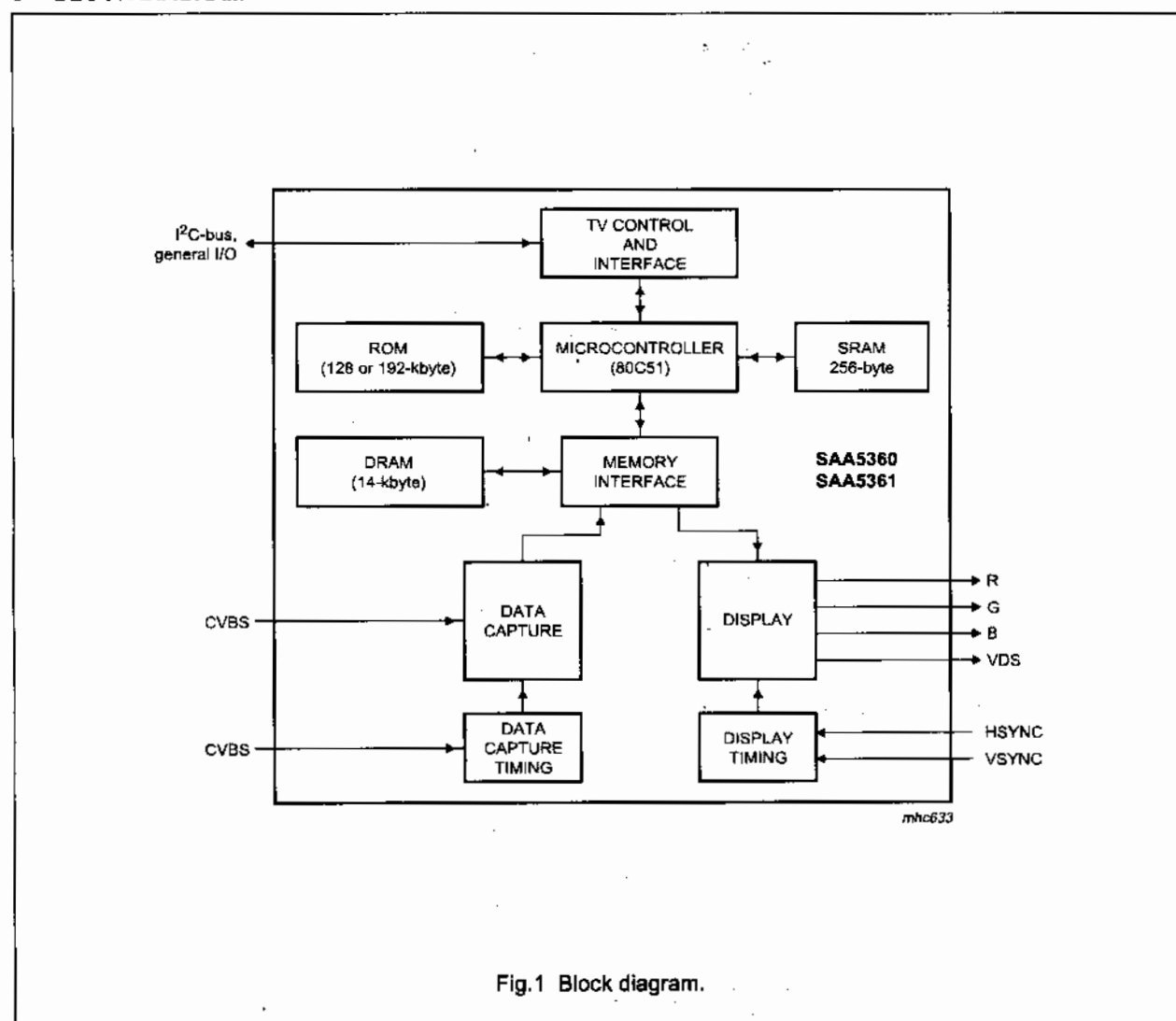


Fig.1 Block diagram.

## Features

- **Low-Voltage and Standard-Voltage Operation**
  - 5.0 ( $V_{CC} = 4.5V$  to  $5.5V$ )
  - 2.7 ( $V_{CC} = 2.7V$  to  $5.5V$ )
  - 2.5 ( $V_{CC} = 2.5V$  to  $5.5V$ )
  - 1.8 ( $V_{CC} = 1.8V$  to  $5.5V$ )
- **Low-Power Devices ( $I_{SB} = 2 \mu A$  @  $5.5V$ ) Available**
- **Internally Organized 4096 x 8, 8192 x 8**
- **2-Wire Serial Interface**
- **Schmitt Trigger, Filtered Inputs for Noise Suppression**
- **Bidirectional Data Transfer Protocol**
- **100 kHz (1.8V, 2.5V, 2.7V) and 400 kHz (5V) Clock Rate**
- **Write Protect Pin for Hardware Data Protection**
- **32-Byte Page Write Mode (Partial Page Writes Allowed)**
- **Self-Timed Write Cycle (10 ms max)**
- **High Reliability**
  - **Endurance: 1 Million Write Cycles**
  - **Data Retention: 100 Years**
  - **ESD Protection: >3,000V**
- **Automotive Grade and Extended Temperature Devices Available**
- **8-Pin JEDEC PDIP, 8-Pin JEDEC SOIC, 8-Pin EIAJ SOIC, and 8-pin TSSOP Packages**

## Description

The AT24C32/64 provides 32,768/65,536 bits of serial electrically erasable and programmable read only memory (EEPROM) organized as 4096/8192 words of 8 bits each. The device's cascadable feature allows up to 8 devices to share a common 2-wire bus. The device is optimized for use in many industrial and commercial applications where low power and low voltage operation are essential. The AT24C32/64 is available in space saving 8-pin JEDEC PDIP, 8-pin JEDEC SOIC, 8-pin EIAJ SOIC, and 8-pin TSSOP (AT24C64) packages and is accessed via a 2-wire serial interface. In addition, the entire family is available in 5.0V (4.5V to 5.5V), 2.7V (2.7V to 5.5V), 2.5V (2.5V to 5.5V) and 1.8V (1.8V to 5.5V) versions.

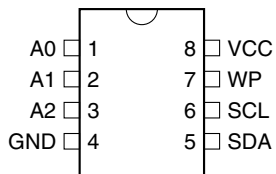
## Pin Configurations

Pin Name	Function
A0 - A2	Address Inputs
SDA	Serial Data
SCL	Serial Clock Input
WP	Write Protect

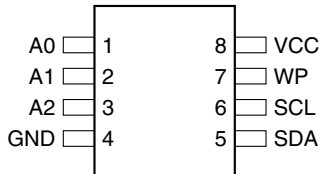
8-Pin TSSOP



8-Pin PDIP



8-Pin SOIC



## 2-Wire Serial EEPROM

32K (4096 x 8)

64K (8192 x 8)

## AT24C32 AT24C64

Rev. 0336G-04/01

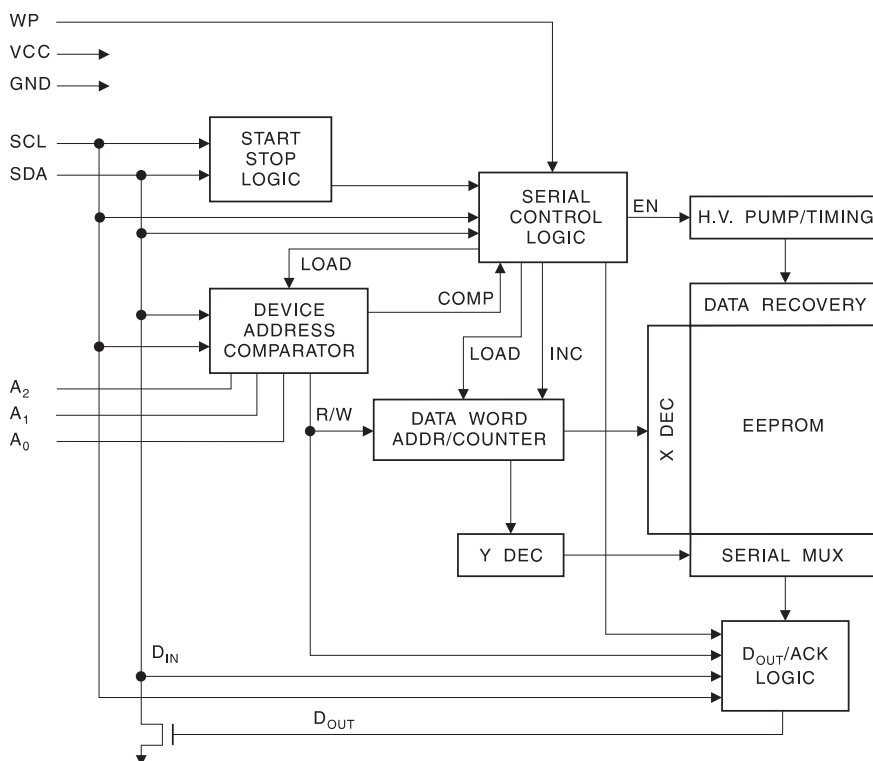


## Absolute Maximum Ratings\*

Operating Temperature .....	-55°C to +125°C
Storage Temperature .....	-65°C to +150°C
Voltage on Any Pin with Respect to Ground .....	-1.0V to +7.0V
Maximum Operating Voltage .....	6.25V
DC Output Current.....	5.0 mA

**\*NOTICE:** Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## Block Diagram



## Pin Description

**SERIAL CLOCK (SCL):** The SCL input is used to positive edge clock data into each EEPROM device and negative edge clock data out of each device.

**SERIAL DATA (SDA):** The SDA pin is bidirectional for serial data transfer. This pin is open-drain driven and may be wire-ORed with any number of other open-drain or open collector devices.

**DEVICE/PAGE ADDRESSES (A<sub>2</sub>, A<sub>1</sub>, A<sub>0</sub>):** The A<sub>2</sub>, A<sub>1</sub> and A<sub>0</sub> pins are device address inputs that are hard wired or left not connected for hardware compatibility with AT24C16. When the pins are hardwired, as many as eight 32K/64K devices may be addressed on a single bus system (device addressing is discussed in detail under the

Device Addressing section). When the pins are not hardwired, the default A<sub>2</sub>, A<sub>1</sub>, and A<sub>0</sub> are zero.

**WRITE PROTECT (WP):** The write protect input, when tied to GND, allows normal write operations. When WP is tied high to V<sub>CC</sub>, all write operations to the upper quadrant (8/16K bits) of memory are inhibited. If left unconnected, WP is internally pulled down to GND.

## Memory Organization

**AT24C32/64, 32K/64K SERIAL EEPROM:** The 32K/64K is internally organized as 256 pages of 32 bytes each. Random word addressing requires a 12/13 bit data word address.

### Features

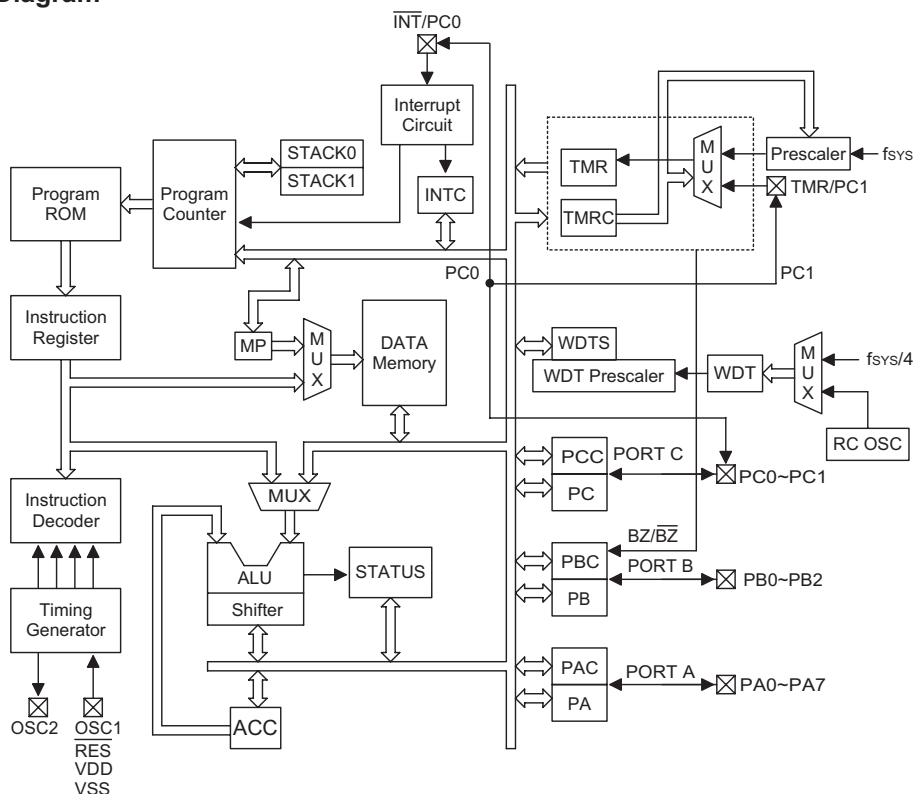
- Operating voltage:  
f<sub>sys</sub>=4MHz: 2.2V~5.5V  
f<sub>sys</sub>=8MHz: 3.3V~5.5V
- 13 bidirectional I/O lines
- An interrupt input shared with an I/O line
- 8-bit programmable timer/event counter with overflow interrupt and 8-stage prescaler
- On-chip crystal and RC oscillator
- Watchdog Timer
- 1024×14 program memory ROM
- 64×8 data memory RAM
- Buzzer driving pair and PFD supported
- HALT function and wake-up feature reduce power consumption
- Up to 0.5μs instruction cycle with 8MHz system clock at V<sub>DD</sub>=5V
- All instructions in one or two machine cycles
- 14-bit table read instruction
- Two-level subroutine nesting
- Bit manipulation instruction
- 63 powerful instructions
- Low voltage reset function
- 16-pin SSOP package  
18-pin DIP/SOP package

### General Description

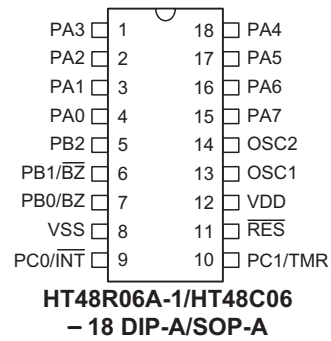
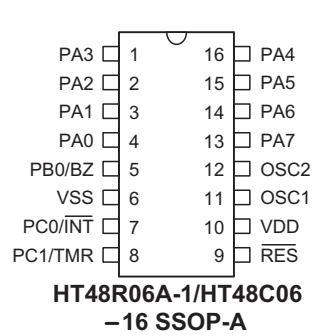
The HT48R06A-1/HT48C06 are 8-bit high performance, RISC architecture microcontroller devices specifically designed for cost-effective multiple I/O control product applications. The mask version HT48C06 is fully pin and functionally compatible with the OTP version HT48R06A-1 device.

The advantages of low power consumption, I/O flexibility, timer functions, oscillator options, HALT and wake-up functions, watchdog timer, buzzer driver, as well as low cost, enhance the versatility of these devices to suit a wide range of application possibilities such as industrial control, consumer products, subsystem controllers, etc.

### Block Diagram

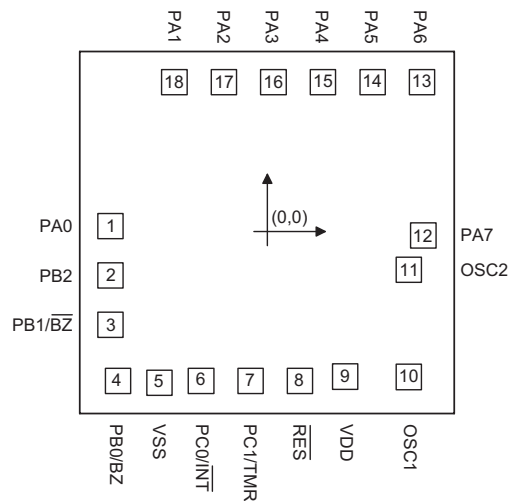


## Pin Assignment



## Pad Assignment

### HT48C06



\* The IC substrate should be connected to VSS in the PCB layout artwork.

**Pad Description**

Pad Name	I/O	Options	Description
PA0~PA7	I/O	Pull-high* Wake-up	Bidirectional 8-bit input/output port. Each bit can be configured as wake-up input by options. Software instructions determine the CMOS output or Schmitt trigger input with a pull-high resistor (determined by pull-high options).
PB0/BZ PB1/BZ PB2	I/O	Pull-high* I/O or BZ/BZ	Bidirectional 3-bit input/output port. Software instructions determine the CMOS output or Schmitt trigger input with a pull-high resistor (determined by pull-high options). The PB0 and PB1 are pin-shared with the BZ and $\overline{BZ}$ , respectively. Once the PB0 and PB1 are selected as buzzer driving outputs, the output signals come from an internal PFD generator (shared with a timer/event counter).
VSS	—	—	Negative power supply, ground
PC0/ $\overline{INT}$ PC1/TMR	I/O	Pull-high*	Bidirectional I/O lines. Software instructions determine the CMOS output or Schmitt trigger input with a pull-high resistor (determined by pull-high options). The external interrupt and timer input are pin-shared with the PC0 and PC1, respectively. The external interrupt input is activated on a high to low transition.
$\overline{RES}$	I	—	Schmitt trigger reset input. Active low
VDD	—	—	Positive power supply
OSC1 OSC2	I O	Crystal or RC	OSC1, OSC2 are connected to an RC network or Crystal (determined by options) for the internal system clock. In the case of RC operation, OSC2 is the output terminal for 1/4 system clock.

\* All pull-high resistors are controlled by an option bit.

**Absolute Maximum Ratings**

Supply Voltage .....	$V_{SS}-0.3V$ to $V_{SS}+6.0V$	Storage Temperature .....	-50°C to 125°C
Input Voltage.....	$V_{SS}-0.3V$ to $V_{DD}+0.3V$	Operating Temperature.....	-40°C to 85°C

Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

**D.C. Characteristics**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>DD</sub>	Conditions				
V <sub>DD</sub>	Operating Voltage	—	f <sub>SYS</sub> =4MHz	2.2	—	5.5	V
		—	f <sub>SYS</sub> =8MHz	3.3	—	5.5	V
I <sub>DD1</sub>	Operating Current (Crystal OSC)	3V	No load, f <sub>SYS</sub> =4MHz	—	0.6	1.5	mA
		5V		—	2	4	mA
I <sub>DD2</sub>	Operating Current (RC OSC)	3V	No load, f <sub>SYS</sub> =4MHz	—	0.8	1.5	mA
		5V		—	2.5	4	mA
I <sub>DD3</sub>	Operating Current (Crystal OSC)	5V	No load, f <sub>SYS</sub> =8MHz	—	3	5	mA
I <sub>STB1</sub>	Standby Current (WDT Enabled)	3V	No load, system HALT	—	—	5	μA
		5V		—	—	10	μA
I <sub>STB2</sub>	Standby Current (WDT Disabled)	3V	No load, system HALT	—	—	1	μA
		5V		—	—	2	μA
V <sub>IL1</sub>	Input Low Voltage for I/O Ports, TMR and INT	—	—	0	—	0.3V <sub>DD</sub>	V
V <sub>IH1</sub>	Input High Voltage for I/O Ports, TMR and INT	—	—	0.7V <sub>DD</sub>	—	V <sub>DD</sub>	V
V <sub>IL2</sub>	Input Low Voltage (RES)	—	—	0	—	0.4V <sub>DD</sub>	V
V <sub>IH2</sub>	Input High Voltage (RES)	—	—	0.9V <sub>DD</sub>	—	V <sub>DD</sub>	V
V <sub>LVR</sub>	Low Voltage Reset	—	LVR enabled	2.7	3.0	3.3	V
I <sub>OL</sub>	I/O Port Sink Current	3V	V <sub>OL</sub> =0.1V <sub>DD</sub>	4	8	—	mA
		5V		10	20	—	mA
I <sub>OH</sub>	I/O Port Source Current	3V	V <sub>OH</sub> =0.9V <sub>DD</sub>	-2	-4	—	mA
		5V		-5	-10	—	mA
R <sub>PH</sub>	Pull-high Resistance	3V	—	40	60	80	kΩ
		5V	—	10	30	50	kΩ



# FHP A3 PANEL DATASHEET

10.2.2	I <sup>2</sup> C Specification .....
10.2.3	Other Specification.....
10.2.4	Interface Signal Specification .....
10.2.5	Input Signal Definition and Function .....
10.2.6	LVDS Signal Definition and Function.....
10.2.7	Video Signal Definition and Function .....
10.2.8	Video Signal Interface Timing Condition.....
10.2.9	LVDS Interface Timing Condition .....
10.2.10	LVDS Connection Circuit .....
10.2.11	MPU Communication Interface Condition.....
10.3	Connectors and Connections .....
10.4	Status and Function Specification .....
10.4.1	PDP Module Status.....
10.4.2	MPU Control (Parameter Setting) .....
10.4.2.1	Address Map.....
10.4.2.2	Details of setting .....
10.4.2.3	About sub address FF .....
10.4.2.4	Reverse $\gamma$ correction parameter setting .....
10.4.2.5	Reverse $\gamma$ correction DC parameter .....
10.4.2.6	Condition code .....
10.4.2.7	IRQ Operation.....
ADDENDUM .....	
UPDATE HISTORY .....	

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## WARNINGS / CAUTIONS / NOTICES

TO PREVENT POSSIBLE DANGER, DAMAGE, AND BODILY HARM WHEN HANDLING THE PLASMA DISPLAY MODULE, PLEASE CONSIDER AND OBSERVE ALL WARNINGS, CAUTIONS AND NOTICES CONTAINED IN THIS SECTION.

This section is described based on the following two controls of EC:

1. EC Product Liability ( PL ) ( Council Directive 85/374/EEC of 25 July 1985 )
2. General Product Safety ( Council Directive 92/59/EEC )

Contents of this is not specification but the customer is requested to agree that FHP do not take any responsibility if the PDP is used beyond the contents of this and then lead to accident.

### Warnings

Failure to heed the following warnings when handling the PDP module could result in injury or even death:

1. Caution is required when handling the PDP module because it is controlled by very high voltage (approx. 300 V). If you need to handle the module while it is still operating or after it has just been powered off, guard against electric shock by never touching the module's drive circuitry areas or its metallic parts. The capacitors in the drive circuitry areas remain temporarily charged even after the power is turned off, and if the residual voltage is strong enough, it can cause electric shock. Therefore, after turning the power off, you must wait at least one minute before touching the module.
2. Do not use any other power supply voltage for the PDP module than the specified voltage in this product specification. Any deviation from the product specification could cause the product to fail.
3. Do not operate or install the PDP module under conditions that deviate from its environmental specification because doing so could result in electric shock or product failure. Inappropriate conditions include moisture, rain, or near water sources (such as a bath tub, laundry tub, kitchen sink, wet basement, swimming pool) and also near fire or heat sources (such as near or over a radiator or heat resistor or even direct sunlight or any setting where there is extreme heat).
4. If any foreign objects such as liquids (including water), metallic chips, or dust fall into the PDP module, immediately turn off the power supply voltage. Also, never push objects of any kind into the PDP module since they may come in contact with dangerous voltage points or create short circuits that could result in a fire hazard or electric shock.
5. If any smoke, offensive smell, or unusual noise comes from the PDP module and also the PDP screen does not display a picture after power-on or while operating, immediately turn off the module's power supply due to risk of electric shock. Never continue operating the PDP module under these conditions.
6. Do not disconnect or connect the PDP module's connector while the power supply is on or just after power-off due to risk of electric shock. Because the PDP module is operated by high voltage, the drive circuit capacitors remain temporarily charged even after the power is turned off. If you need to disconnect or connect the module, wait at least one minute after power-off.
7. Do not disconnect or connect the power connector if your hands are damp due to risk of electric shock.
8. Do not damage or modify the power cable of the PDP module due to risk of electric shock.
9. If the power connector is covered with dust or dirt, wipe it with a dry cloth before powering on the display. Because it could cause a fire hazard.

# FHP A3 PANEL DATASHEET

## Caution

Failure to heed the following cautions when handling the PDP module could result in personal injury or property damage:

1. Do not set the PDP module on an unstable, moving, or inclined surface. The PDP module could drop off and cause serious personal injury or damage the product.
2. If you need to relocate the PDP module, always turn off the power supply and detach the interface and power cables from the PDP module to avoid damaging the cable or dropping the module. A damaged cable could cause electric shock or a dropped PDP module could be damaged or cause personal injury. Also remember to watch your step while working.
3. When you remove or connect the PDP module's cable, you must turn off the power supply and securely hold the connector. If you forcibly remove the cable, the electric wire in the cable could be exposed or broken and could cause electric shock.
4. A minimum of two persons should carry the PDP module in order to avoid accidents or injury.
5. Do not touch the glass surface of the PDP module while it is operating because its temperature increases and could cause a burn injury.
6. The PDP module has a glass plate which is fragile. It has to be handled with care to avoid its breakage and injury of person.
7. If the glass surface breaks, do not handle the broken glass with bare hands since that could result in a cut or injury.
8. Do not place any object on the PDP module's glass surface because it can be scratched or broken.
9. Do not place any object on the PDP module because it could cause a personal injury if the module fell.

## Precautions Related to Usage of PDP Module

FUJITSU HITACHI PLASMA DISPLAY PDP module is intended for use in standard applications (computers, office automation and other office equipment, industrial, communications, and measurement equipment, personal or household devices, etc.). Customers considering the use of our products in special applications where failure or abnormal operation may directly affect human lives or cause physical injury or property damage, or where extremely high levels of reliability are demanded (such as aerospace systems, atomic energy controls, vehicle operating controls, medical devices for life support, etc.) are requested to consult with FUJITSU HITACHI PLASMA DISPLAY sales representatives before such use. The company will not be responsible for damages arising from such use without prior approval.

## Observance of Safety Regulations and Standards

Most countries in the world have established standards and regulations regarding safety, protection from electromagnetic interference, etc. Customers are requested to observe applicable regulations and standards in the design of products.



## Notice for System Designers

1. If the PDP module displays a fixed pattern on the screen, the Image-storage, which means a difference in the luminance between a fixed pattern area and the other areas caused by difference of temperature or discharge area, or the Image-burn-in, which means a difference in the luminance caused by degradation of the phosphor, might be occurred. In order to keep the picture quality, we recommend to use the valid display area of PDP module equivalently and also to use a screen-saver technique.
2. PDP module can be permanently damaged by application of stress (voltage, current, temperature, etc.) in excess of certain established limits, called absolute maximum ratings. Do not exceed these ratings.
3. Recommended operating conditions are normal operating ranges for the PDP module. All the device's electrical characteristics are warranted when operated within these ranges. Always use semiconductor devices within the recommended operating conditions. Operation outside these ranges may adversely affect reliability and could result in device failure. No warranty is made with respect to uses, operating conditions, or combinations not represented on the data sheet. Users considering application outside the listed conditions are advised to contact their FUJITSU HITACHI PLASMA DISPLAY sales representative beforehand.
4. The PDP module radiates infrared rays between 800 and 1000 nm so that it could cause an IR-remote controller of another electric system to misoperate. To avoid this, you should consider adding the IR absorption filter to your system.
5. The PDP module has a high-voltage switching circuit and a high-speed clock circuit. Therefore, you need to evaluate the EMC requirements of your system.
6. It should be considered in your mechanical design that the PDP module has a glass plate. Avoid excessive shock and stress to the glass surface and be careful not to damage the tip-tube at the corner of the glass plate. Damage to the glass plate or tip-tube could result in failure of the PDP module.
7. The PDP module is controlled by high voltage. While designing, remember that all voltage of the PDP module should be discharged immediately after power-off. And the power on sequence ( $V_{cc} \rightarrow V_a/V_s$ ) and the power off sequence ( $V_a/V_s \rightarrow V_{cc}$ ) are required.
8. Because the PDP module generates heat while operating, radiation and ventilation must be incorporated into your system design. The PDP module could fail if operated at temperatures outside of the specified ambient temperature.
9. The ventilation design of your system should be considered that foreign objects, which may prevent normal operation, would not touch to the PDP module because the PDP module has high-density and high-voltage electrical parts. Condensation or dust on the driver circuit could cause a short circuit or dielectric breakdown.
10. Based on the requirements of the safety standard (UL, EN etc.), be sure to add the filter that come up to the impact test to the glass pate.
11. The PDP screen is controlled with display-data signals and synchronized signals. If noise interferes with these signals, the PDP screen could become unstable. Therefore you may be required to take measures in order to reduce or minimize the effects of noise when you will design.
12. PDP module has an inherent chance of failure. You must protect against injury, damage or loss from such failures by incorporating safety design measures into your facility and equipment such as redundancy and prevention of over-current levels and other abnormal operating conditions.
13. The thermal management, Image Storage, and Image Burn-In should be considered when you design and evaluate the system.
14. Please make careful evaluation of EMC characteristics when you design the system.

## Notice of Operation and Handling of the PDP Module

1. If the PDP module displays a fixed pattern on the screen, it can make a difference in the luminance and chromaticity between a fixed pattern area and the other areas. This phenomenon can be recovered by using the valid display area of PDP module equivalently. However, if the fixed pattern is displayed repeatedly for extended periods of time, then a difference in the luminance and chromaticity could not be recovered. Therefore if you intend to display fixed patterns, a screen-saver technique should be incorporated into your system to minimize image retention.
2. The PDP module is controlled by high voltage. While operating the module and immediately after powering it off, never disconnect or connect the module's power connector because this could cause a failure. If you need to disconnect or connect the module, wait at least one minute after power-off.
3. If you watch the PDP screen for a long period of time, your eyes may become fatigued. It is recommended that you rest your eyes occasionally. With the limited knowledge currently available there is no indication that there is a potential risk of eye damages while watching a working PDP module for a long period of time.
4. To ensure reliable operation of the PDP module and to protect it from overheating, never wrap or cover the module with anything. Also, never place the PDP module in a confined space or any place that has poor ventilation.
5. To prevent a defect or failure, be sure to check the cable connections and power supply condition before power-on.
6. To avoid possible electric shock, make sure the power supply voltage of the PDP module is turned off before cleaning. To clean the PDP module's glass panel, apply water or a natural detergent to a piece of soft cloth or gauze. Make sure that no water comes in contact with the connecting terminals on the side of the glass panel. Never use chemical solvents, such as paint thinner or benzene, to clean the glass panel.
7. The PDP module is composed of several materials such as glass, metals, and plastics. To dispose of the module, you should consult a qualified service engineer.
8. The PDP module is equipped with various protection circuits that automatically turn the module off if an interface signal or the power voltage becomes abnormal while it is operating. If the PDP module suddenly stops operating while it is on, check the input signal and power source conditions before restarting it.
9. If an abnormal situation occurs, such as if the input connector becomes disconnected, the PDP module will go into stand-by and the high output voltage will stop even if external power is supplied. If a normal signal is input after this happens, operations will resume. Moreover, if the PDP module is operating normally and an abnormal situation occurs, normal operation will resume with the re-inputting of a normal signal.
10. Do not place any equipment that generates excessive EMI/RFI noise near the interface cable of the PDP module and try to keep all cables as short as possible.
11. Be careful not to break the glass panel when handling the PDP module. Also, wear gloves or other hand protection when handling the module in order to prevent injuries that can occur if the glass panel breaks.
12. Do not recombine, restructure or disassemble the PDP module. The glass panel section and drive circuit section of the PDP module are closely connected and function as a pair. If the module is arbitrarily recombined, restructured, or disassembled, FUJITSU HITACHI PLASMA DISPLAY will not be responsible for the function, quality, or operational integrity of the modified module.
13. When delivering or transporting the PDP module, protect the module from excessive vibration or shock. If the module is dropped or if excessive vibration or shock is applied to it, the glass panel of the PDP module could break and the drive circuit could become damaged. All packaging for delivering or transporting the module should be designed for reliable shipping.

## FHP A3 PANEL DATASHEET

14. The information and circuit diagrams in this document are presented as examples of display applications, and are not intended to be incorporated in devices for actual use. Also, FUJITSU HITACHI PLASMA DISPLAY is unable to assume responsibility for infringement of any patent rights or other rights of third parties arising from the use of this information or circuit diagrams.
15. If any products described in this document represent goods or technologies subject to certain restrictions on export under any of applicable laws or regulations, the prior authorization by such applicable governments will be required for export of those products.
16. PDP module uses semiconductor devices. Because semiconductor devices are particularly susceptible to damage by static electricity, you must take the following precautions when transporting, delivering, or handling the module: Eliminate static body electricity by the use of rings or bracelets connected to ground through high resistance (on the level of  $1\text{M}\Omega$ ). Wearing of conductive clothing and shoes, use of conductive floor mats and other measures to minimize shock loads is recommended. Ground all fixtures and instruments, or protect with anti-static measures. Also, when transporting or delivering the PDP module, always put it in an anti-static bag.
17. When high-voltage charges exist close to PDP module, discharges can cause abnormal operation. In such cases, use anti-static measures or processing to prevent discharges.
18. Exposure to corrosive gases (e.g. in the case material containing sulphur compound is used in the set or the set is used in the coastal area) or contact with oil may lead to chemical reactions that will adversely affect the device. If you use PDP module in such conditions, consider ways to prevent such exposure or to protect the PDP module..
19. PDP module is not designed for environments involving exposure to radiation or cosmic radiation. Users should provide shielding as appropriate.
20. PDP module uses plastic molded devices. However these devices are flammable, and therefore should not be used near combustible substances. If devices begin to smoke or burn, there is danger of the release of toxic gases.
21. The recommended operating conditions are required in order to ensure the normal operation of the PDP module. PDP module's electrical characteristics are warranted when the module is operated within these ranges. Always use PDP module within their recommended operating condition ranges. Operation outside these ranges may adversely affect reliability and could result in module failure.
22. Electrodes on a glass surface of the PDP module and PCB are connected by flexible cable. Therefore, do not inflict excessive stress on the glass surface, PCB, and flexible cable, such as shock, vibration, bending, heat-shock, pressing, or striking. These actions could break or damage to PDP module.
23. The contents of this document are described for the products with the initial parameter setting at shipment, if there is no special notice.
24. The glass surface of the display is cleaned up before shipping, but if there is fine dust etc., please use this product after removing. When it is needed to clean the surface of the glass panel in the customer due to any dust and dirt, please use soft cloth with detergent to wipe them off and do not use the chemicals like acid, alkali and organic solvent..

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## Storage of PDP Module

1. When storing the PDP module, select an environmentally controlled place. Also, avoid any environment that exceeds the module's temperature or humidity specifications. Sometimes the PDP module does not discharge easily after long storage. In this case, about 2 hours full white display (aging) is recommended. Please execute aging one time at half a year.
2. Avoid exposure to rapid temperature changes, which cause moisture to condense inside the product. Store products in locations where temperature changes are slight.
3. Avoid storing packages where they are exposed to corrosive gases or high levels of dust.
4. When transferring the PDP module by a forklift or crane, the only eligible person to operate them can do this work.

## Repair and Maintenance

The repair and maintenance of this product cannot be held at user site locally as this product is manufactured with various kinds of test and adjustment. This issue has to be determined separately from this specification.

## Other

1. Customers considering the use of FUJITSU HITACHI PLASMA DISPLAY products in other special environmental conditions should consult with FUJITSU HITACHI PLASMA DISPLAY sales representatives.
2. The contents of this document may not be reproduced or copied without the permission of FUJITSU HITACHI PLASMA DISPLAY Ltd.

## 106cm(42-inch) High Definition Plasma Display Module Product Specification

### 1. Description

This specification manual applies to the 106cm(42-inch) high definition plasma display module.

This module utilizes ALIS method (Alternate Lighting of Surfaces method; originally developed by FUJITSU LIMITED) to realize high definition picture with interlaced signal input.

All specifications of which condition is not described are specified with initial parameter setting as shipment at room temperature ( $T_a=20\pm 5^{\circ}\text{C}$ ).

### 2. Product Name and Model Number

(1) Product name: 106cm(42-inch) high definition plasma display module (abbreviation: PDP module)

(2) Product model number: FPF42C128128UE-51

### 3. Block Diagram

Figure 1 is a block diagram of this PDP module.\*

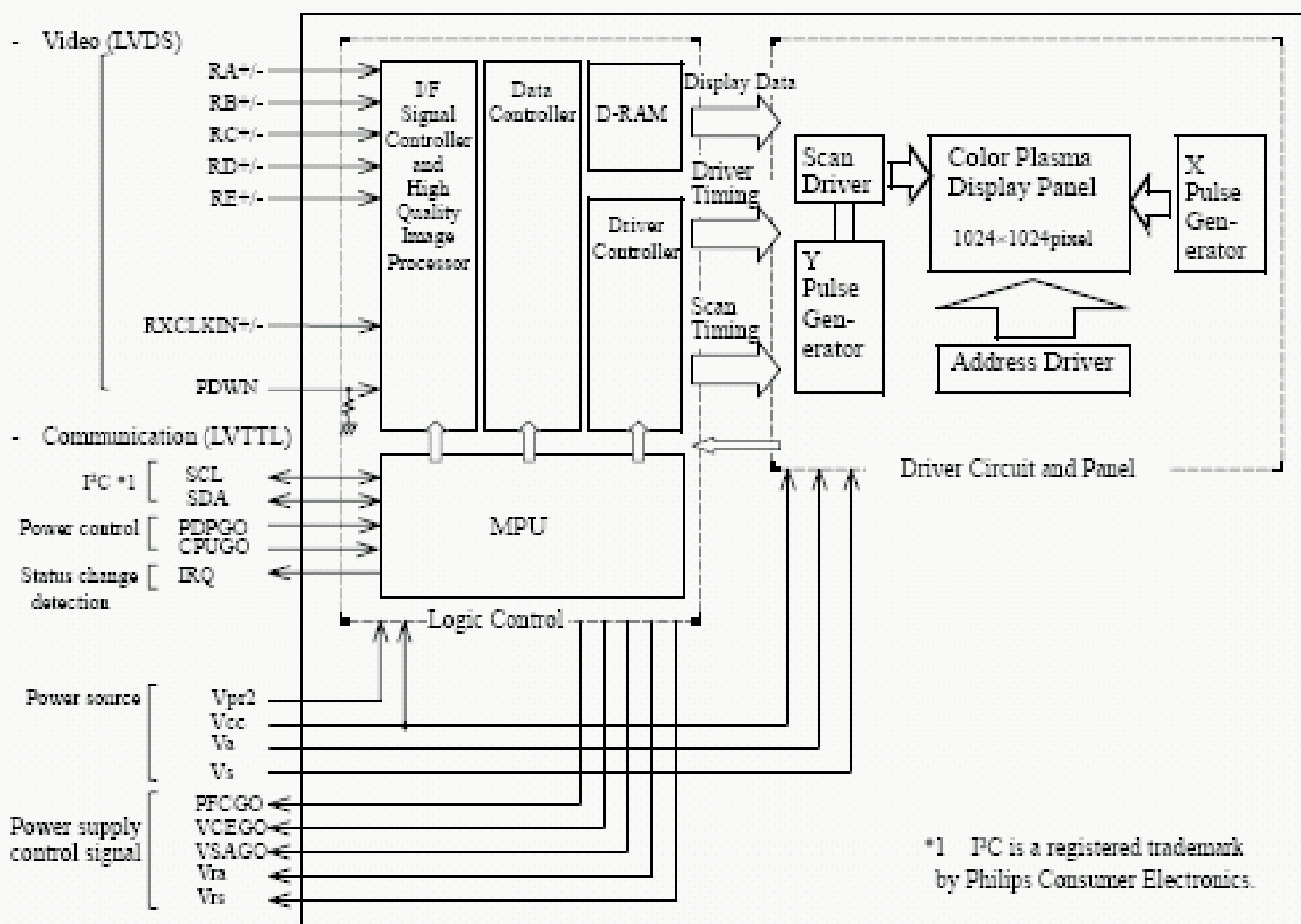


Figure 1. Block Diagram



4. Display Characteristics

4.1 Display Performance

(outgoing specification)

No.	Item	Ratings					
1	Display pixels	Horizontal 1,024 × Vertical 1,024 pixels (1 pixel = 1RGB sub pixel) Interlaced display					
2	Display sub pixels	Horizontal 3,072 × Vertical 1,024 sub pixels					
3	Pixel pitch	Horizontal 0.90 mm × Vertical 0.51 mm					
4	Sub pixel pitch	Horizontal 0.30 mm × Vertical 0.51 mm					
5	Display pixel Form	RGB Stripe (refer to Figure 2)					
6	Effective Display Size	Horizontal 921.60 mm × Vertical 522.24 mm (diagonal 42 inches)					
7	Aspect Ratio	16 : 9					
8	Number of Colors	16.77 million colors					
9	Luminance *1,*2	Condition		Min.	Typ.	Max.	Unit
		Peak white ; Max. gradation setting, display rate: 1% , Vsync = 50/60 Hz		-	(1,400)	-	cd/m <sup>2</sup>
		Averaged value of 9-locations 160 gray scale level (Gamma=1) at chromaticity measurement pattern. *5		700	890	-	
10	Chromaticity *1,*3	Averaged value of the 9-locations 160 gray scale level (Gamma=1) at chromaticity measurement pattern. *5	x	0.265	0.285	0.305	
		Vsync = 50/60 Hz	y	0.275	0.295	0.315	
11	Contrast *1,*4 calculated value.	Peak white, display rate: 1%, In dark room Vsync = 50/60 Hz		-	(3,000):1	-	
		160 gray scale level (Gamma=1) Averaged value of 9-locations *5, In dark room Vsync = 50/60 Hz		1200* ±	1750:1	-	
12	Streaking *1,*5	Full screen white, Max. gradation setting, Vsync = 50/60 Hz		-	3	-	%

Notes:

- \*1• Measured at following conditions.
  - (a) Measuring equipment: Minolta CA-100
  - (b) All PC parameters are initial setting.
  - (c) Measured in 5 minutes after turning on the PDP module.
- \*2 The Luminance with the display ratio of 1%(H:10%,V:10%,center) is for a reference because it is not actually measured one but extrapolated one from that at chromaticity measurement pattern. • Averaged value of the 9-locations is measured according to the figure of “Chromaticity measurement pattern” described in page 14 (Display ratio:10%).
- \*3 Chromaticity is measured according to the figure of “Chromaticity measurement pattern” described in page 14 (Display ratio:10%) and the averaged value of the 9-locations satisfies the specification.

\*4 Contrast ratio with the display ratio of 1% is for a reference. Contrast ratio is calculated from the following equation .

$$\text{Contrast} = \frac{\text{Averaged Luminance of the 9-locations (10\%)}}{\text{All black Luminance}}$$

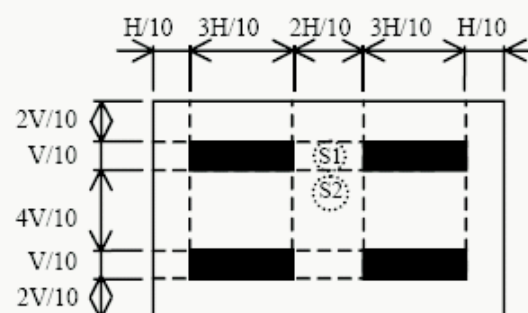
## FHP A3 PANEL DATASHEET

\*5 The chromaticity measurement pattern is the same as the chromaticity uniformity measurement pattern shown at “Display Quality” paragraph.

\*6 Streaking measurement pattern is shown as below.

Streaking is defined as following equation, however this value is not managed in the factory.

$$\text{Streaking} = \frac{(\text{Luminance at S1}) - (\text{Luminance at S2})}{(\text{Luminance at S1})} \times 100\%$$



Streaking measurement pattern

Pixel column 1	Pixel column 2	Pixel column 3	.....	Pixel column 1022	Pixel column 1023	Pixel column 1024
----------------	----------------	----------------	-------	-------------------	-------------------	-------------------

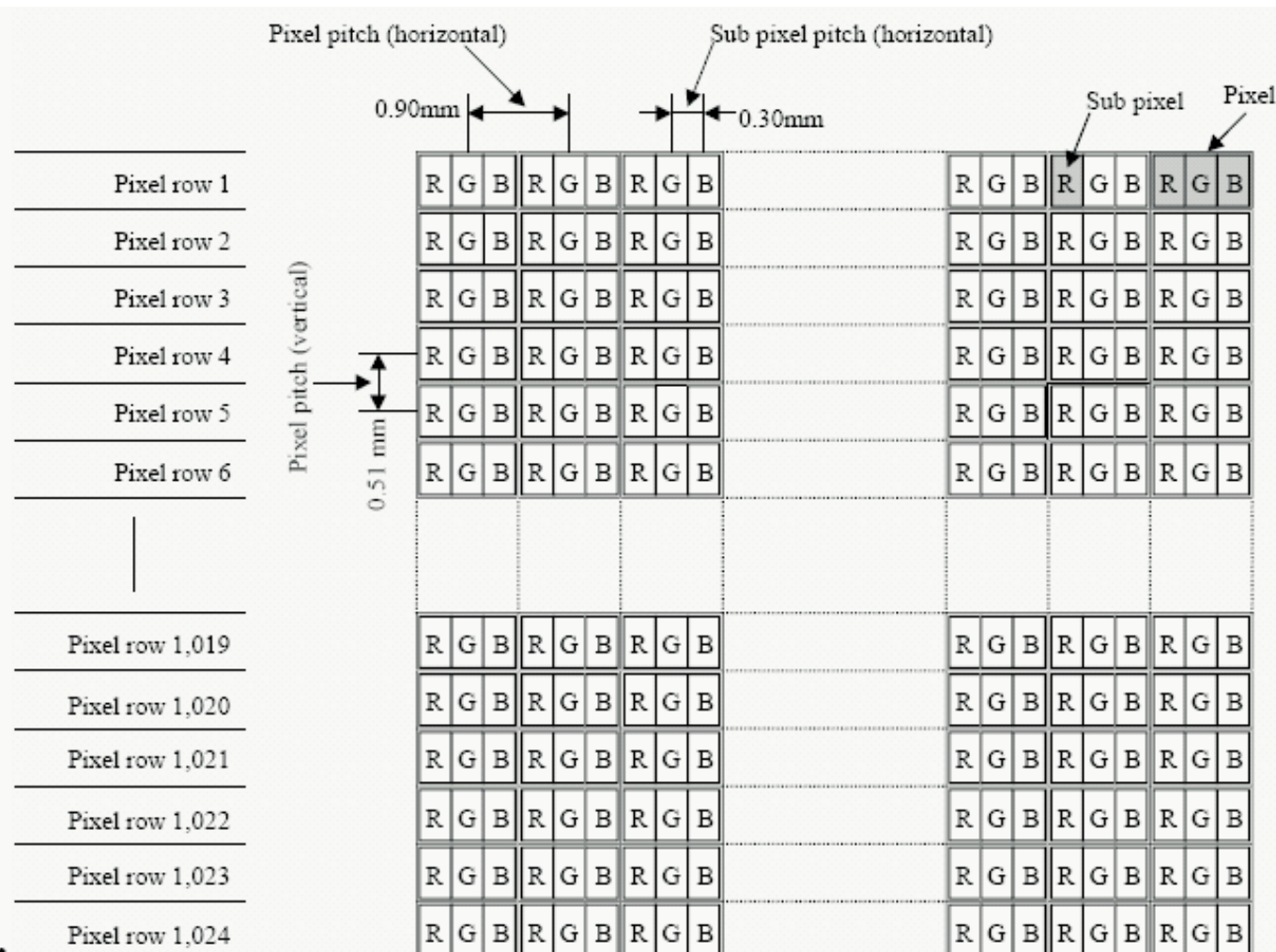


Figure 2. Display Pixel Form

4.4 Noise

Condition	Specification
<div>- Measurement at 1 m from the front center of panel</div> <div>- Background noise : less than 18 dB (A)</div> <div>- Noise meter : Digital Frequency Analyzer Type 2131 (Bruel &amp; kjaer)</div> <div>- Environmental condition : 1013 hPa</div>	Less than 25dB (A)

4.5 Mechanical Specification

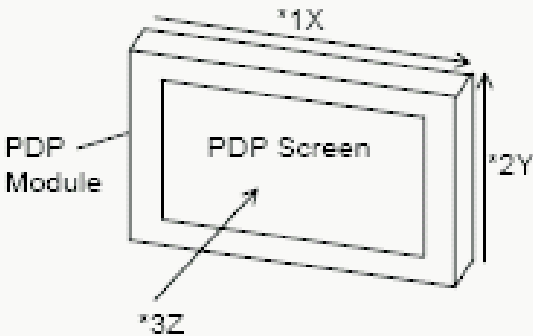
No.	Item	Rating
1	Maximum Outer Dimensions	Width 994 mm × Height 587* * *Thickness 66 mm (See Figures 8.1 and 8.2.)
2	Weight	Approx. 16 kg

4.6 Mechanical Characteristics

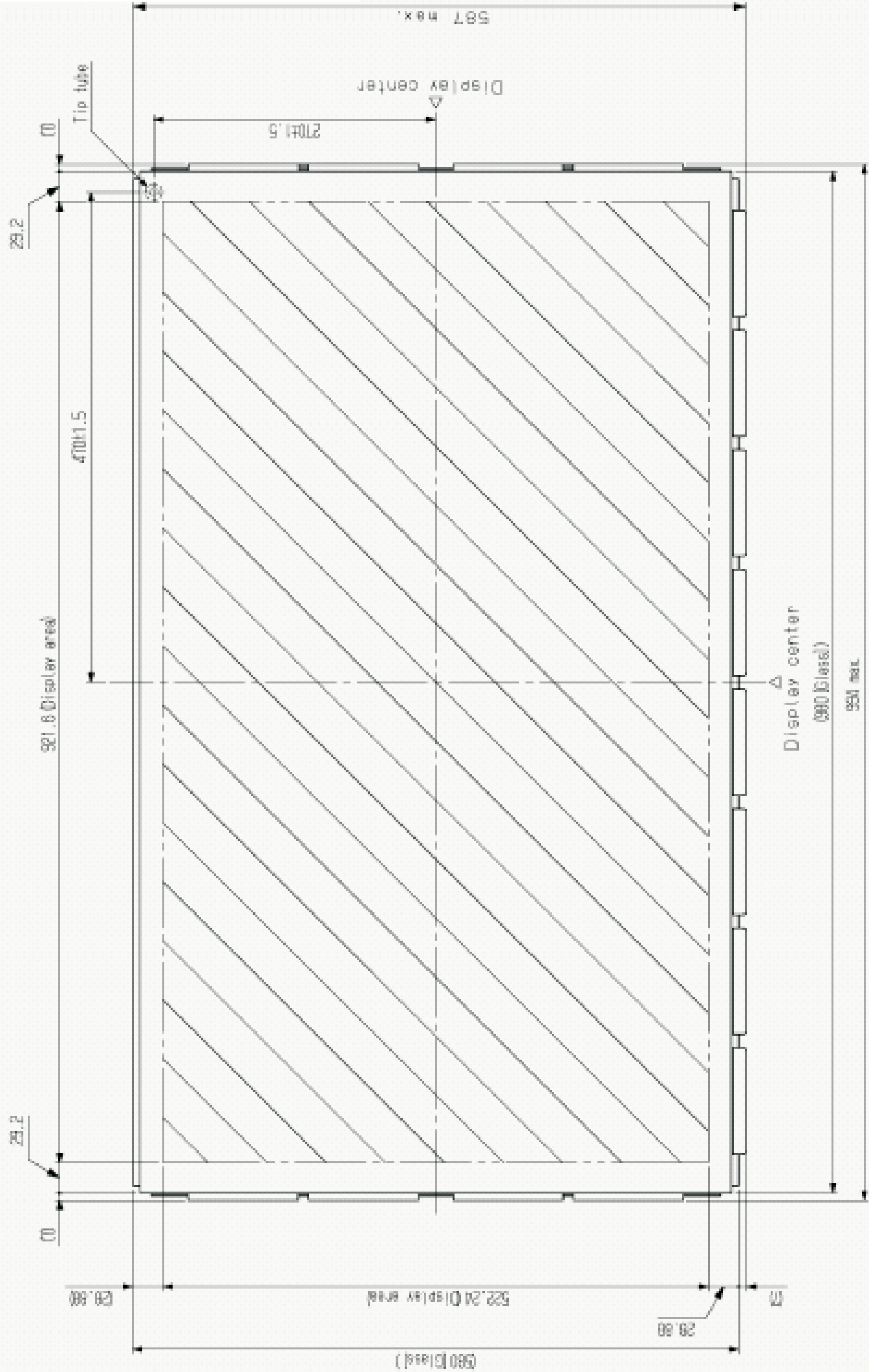
No.	Item	Rating		Remarks
1	Vibration	Operational and Non-operational	Support: Secured to the rigid body at 8 positions on the back. Frequency: 10 to 55 Hz Sweep: 1 minute/octave Amplitude: 0.350 mm-p-p (X direction *1) 0.350 mm-p-p (Y direction *2) 0.175 mm-p-p (Z direction *3) Time: 30 minutes	Vibration-test condition is based on the EN60065 without the Z-direction.
2	Shock	Not operating	Support : Secured to the rigid body at 8 positions on the back. Acceleration : 98m/s² [10G], Time: 11ms (Z direction *3) 196m/s² [20G], Time: 11ms (X and Y directions *1,*2) Number of times : Once	

Notes: \*1, \*2, \*3      Vibration and shock directions are shown below:

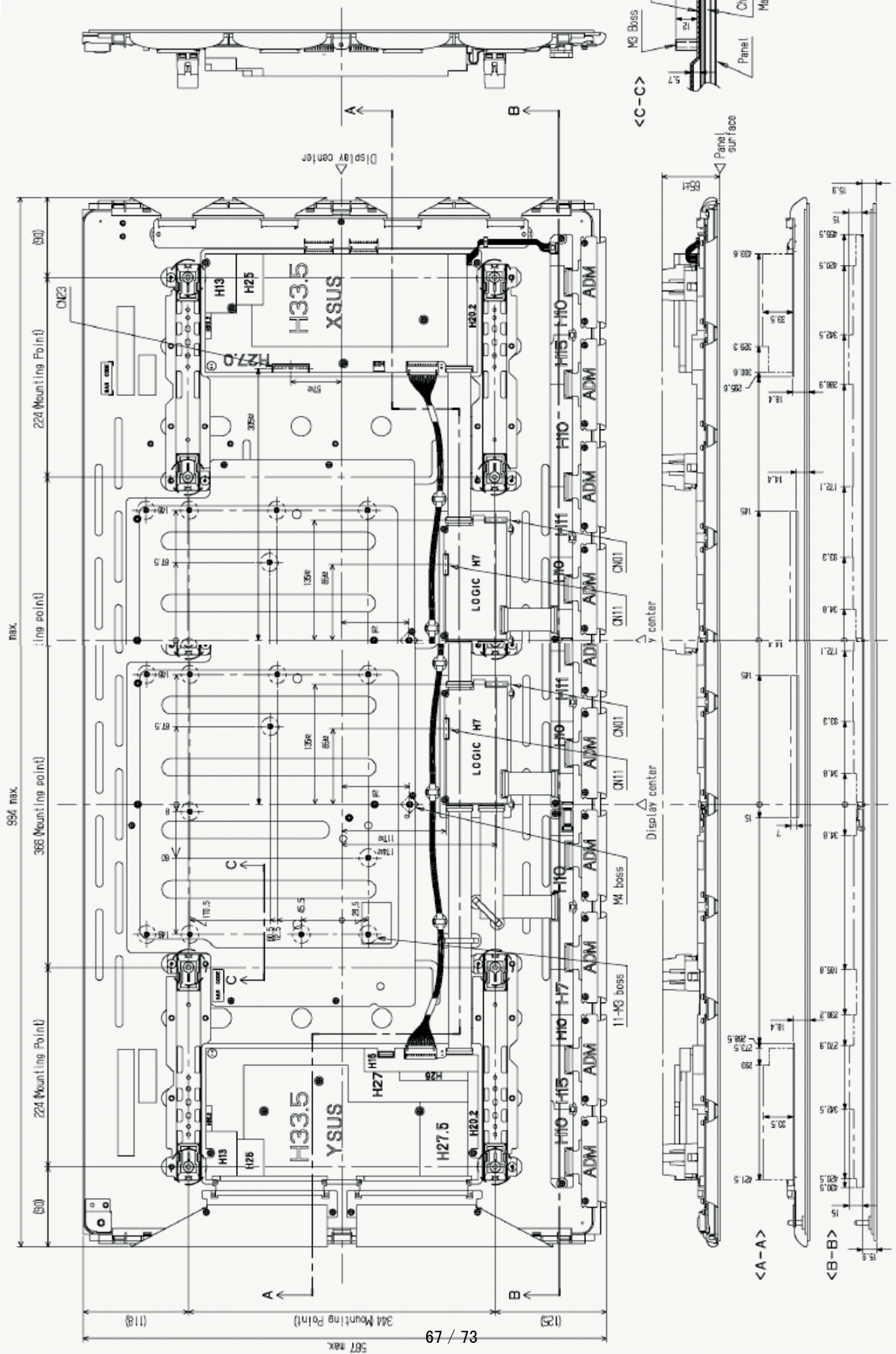
After the vibration and shock test as indicated in the table above, this product still has to comply with the quality items described in Display Quality section (4.2).



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## Spare Part List for PDP4225M

Date: 2006/01/05

Item	Part Number	Part Description	Usage / unit	Unit
1	E6205-42BD01	42" ED PDP MODULE	1	piece
2	900-420203-01B	42" GLASS FILTER	1	piece
3	771E421D01-01	MAIN PCBA	1	set
4	771L421D01-01	AUDIO PCBA	1	set
5	771-421D01-03	S-VIDEO CONVERT PCBA	1	set
6	E7801-081001	POWER PCBA	1	set
7	771-421D01-04	KEY PCBA	1	set
8	E7801-200001	PCB ASSY PSU MAIN FPF23P-100/240A MURATA	1	set
9	771-421D01-02	RCA CONVERT PCB ASSY	1	set
10	771-421D01-01	IR PCBA	1	set
11	786-421D02-01	SPEAKER ASSY SILVER(4225M)	1	set
12	E3219-002003	POWER SOCKET	1	piece
13	E4101-027001	POWER SWITCH	1	piece
14	E4801-125001	SPEAKER	4	piece
15	E4802-015001	TWEETER	2	piece
16	205-42SD02-01R	SPEAKER FRONT CABINET 421D(B) SILVER R	1	piece
17	206-42SD02-01R	SPEAKER BACK CABINET 421D BLACK R	1	piece
18	E3404-157001	AC POWER CORD	1	piece
19	E3402-046015	CABLE AV L=300 R/W 2PIN RCA (FOR FHP)	1	piece
20	E3421-926105	WIRE ASSY 4P/5P 2.0MM L=300MM S-VIDEO (FOR FHP)	1	piece
21	E3421-926095	WIRE ASSY 1.25MM 20P/30P L=450 (LVDS W-EMI) FOR FHP	1	piece
22	E3421-926054	WIER ASSY 6P/6P 2.5MM L=260MM EMI	1	piece
23	E3421-926055	WIRE ASSY 11P/5P+5P 2.5MM L=340MM EMI	1	piece
24	E3421-926104	WIRE ASSY 13P/5P+9P 2.0MM L=480/240MM KEY/IR	1	piece
25	E3421-926107	WIRE ASSY P2.5 3P L=200 FOR AUDIO CONVERT	1	piece
26	E3421-927007	WIRE ASSY 6P L=900MM EMI FOR (FORMOSA)	1	piece

## Spare Part List for PDP4225M

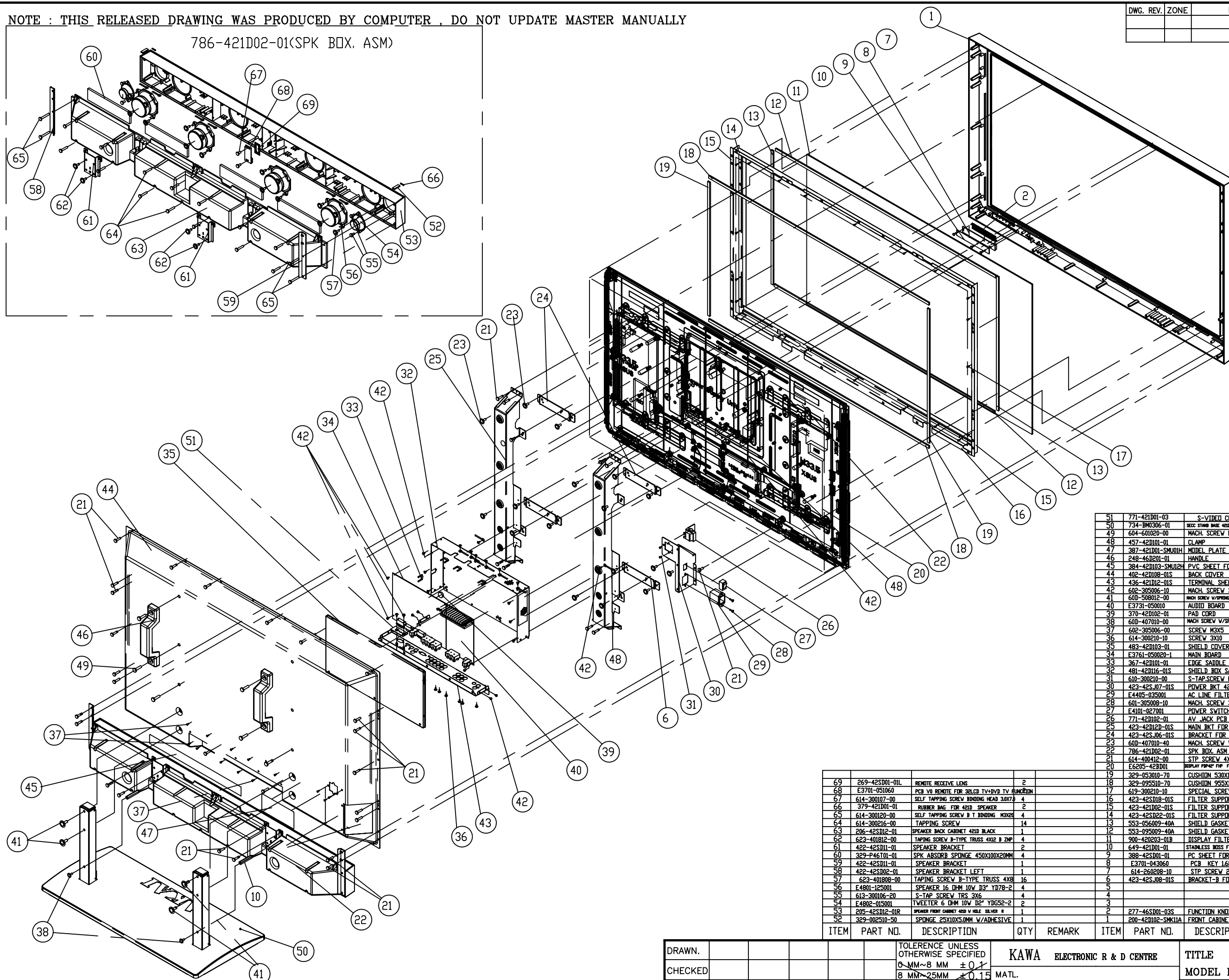
Date: 2006/01/05

Item	Part Number	Part Description	Usage / unit	Unit
27	E3421-927008	WIRE ASSY 3P L=450 AC CORD FORMOSA EMI	1	piece
28	E3421-925020	WIRE ASSY 300MM 3WIRES FOR 42 LCD POWER	1	piece
29	E3421-925057	WIRE ASSY 2.0 9P/9P L=150MM FOR (FHP MAIN POWER TO DIF BOARD)	1	piece
30	E3421-925058	WIRE ASSY 3.96 8P/8P L=230MM FOR (FHP MAIN POWER TO XSUS BOARD)	1	piece
31	E3421-924026	WIRE ASSY 2P L=300 R/B FOR SPK (L/R)	2	piece
32	E3421-924027	WIRE ASSY 2P L=320 R/B FOR SPK (L/R)	2	piece
33	E7501-052001	REMOTE CONTROL	1	piece
34	E7301-010002	AAA SIZE BATTERY	2	piece
35	200-42D102-SMK01A	FRONT CABINET BLACK W/AKAI ENG 421D(C-PW181) MONITOR A	1	Piece
36	277-46SD01-03S	FUNCTION KNOB	1	piece
37	248-46D201-01	HANDLE FOR PLASMA	2	piece
38	269-42SD01-01L	REMOTE RECEIVE LENS	1	piece
39	481-42D116-01S	PCBA SHIELD BOX	1	piece
40	483-42D103-01	PCBA SHIELD TOP COVER	1	piece
41	436-421D01-01S	TERMINAL FRAME	1	piece
42	402-42D107-01S	BACK COVER	1	piece
43	423-42SJ07-01S	POWER BRACKET	1	piece
44	510-421D01-SMU02K	TOP CARTON BOX	1	piece
45	518-421D01-01K	BOTTOM CARTON BOX	1	piece
46	300-42SD03-02C	TOP CUSHION	1	piece
47	300-42SD04-02C	BOTTOM CUSHION	1	piece
48	300-42SD05-01C	POLYFOAM SHEET	2	piece
49	244-34B811-01	CARTON BOX HANDLE	2	piece
50	310-504505-01T	MAIN UNIT PLASTIC BAG	1	piece
51	310-111404-07V	INSTRUCTION MANUAL PLASTIC BAG 11"X14"X0.04	1	piece
52	310-041104-01V	POLYBAG 4"X11"X0.04	1	piece
53	580-P421DHS-MU02L	INSTRUCTION MANUAL	1	piece
54	388-42SB04-01H	POWER SOCKER LABLE	1	piece
55	388-42D103-01H	CAUTION LABEL	1	piece

Item	Part Number	Part Description	Usage / unit	Unit
56	388-421D01-01H	SPEAKER INPUT PLATE	1	piece
57	579-50AA02-01	DANGER CAUTION LABEL	1	piece
58	387-421D01-SMU02H	MODEL PLATE LABEL	1	piece
59	384-42D103-SMU01H	TERMINAL LABEL	1	piece
60	590-421D01-02	WARRANTY SHEET	1	piece
61	593-421D01-02	INSERTION CARD	1	piece
62	579-421D03-01	POP LABEL	1	piece
63	579-42D105-01	PROTECTIVE EARTH LABEL FOR ESA 42TD1	1	piece
64	579-42D102-09	MODEL PLATE SERIAL NUMBER	1	piece
65	579-421D01-02	BAR CODE LABEL	2	piece
66	579-42D103-02	POWER SWITHC LABEL	1	piece
67	568-P46T02-02	WARNING LABEL	1	piece
68	734-BM0306-01	BASE STAND	1	set




DWG. REV.	ZONE	DESCRIPTION	DATE	REVISOR



51	771-421D01-03	S-VIDED CONVERT PCB	1	ASN
50	734-BM0306-01	SECC STAND BASE 428 V/S PACKING SILVER	1	ASN
49	604-601020-00	NACH. SCREW M6X20	6	
48	457-42D101-01	CLAMP	24	
47	387-421D01-SMU01H	MODEL PLATE	1	
46	248-46D201-01	HANDLE	2	
45	384-42D103-SMU12H	PVC SHEET FOR MAIN BOARD	1	
44	402-42D108-01S	BACK COVER	1	
43	436-42D12-01S	TERMINAL SHEET	1	
42	602-305006-10	MACH. SCREW 3X6	41	
41	60D-508012-00	NACH SCREW V/SPRING WASHER N08L020PM B2P	4	
40	E3731-050010	AUDIO BOARD	1	
39	370-42D102-01	PAD CORD	1	
38	60D-407010-00	NACH SCREW V/SPRING WASHER M4 BLACK 2	1	
37	602-305006-00	SCREW M3X5	16	
36	614-300210-10	SCREW 3X10	8	
35	483-42D103-01	SHIELD COVER e-room	1	
34	E3761-050020-1	MAIN BOARD	1	
33	367-42D101-01	EDGE SADDLE 14MM	4	
32	481-42D116-01S	SHIELD BOX SANAAU PCB	1	
31	610-300210-00	S-TAPSCREW RND 3X10	2	
30	423-42S J07-01S	POWER BKT 42SJ	1	
29	E4405-035001	AC LINE FILTER	1	
28	601-305008-10	MACH. SCREW 3X8	2	
27	E4101-027001	POWER SWITCH	1	
26	771-42D102-01	AV JACK PCB	1	
25	423-42D12D-01S	MAIN BKT FDR V6/FORMOSA	2	
24	423-42S J06-01S	BRACKET FDR MAIN BKT 42SJ	1	
23	60D-407010-40	MACH. SCREW V/SP WASHER 4X10	20	
22	786-42D1D02-01	SPK BOX. ASM	1	ASN
21	614-400412-00	STP SCREW 4X12	39	
20	E6205-42BD01	DISPLAY PBP42 FIP FFF42C32B02B2C-S/P V/D PSL	1	
19	329-053010-70	CUSHION 530X10X7MM	2	
18	329-095510-70	CUSHION 955X10X7MM	2	
17	619-300210-10	SPECIAL SCREW 3X10 NP "4"	24	
16	423-42SD18-01S	FILTER SUPPORT BTM	1	
15	423-42D1D02-01S	FILTER SUPPORT L&R	2	
14	423-42SD22-01S	FILTER SUPPORT TOP	1	
13	553-056009-40A	SHIELD GASKET 560X9X4	2	
12	553-095609-40A	SHIELD GASKET 950X9X4	2	
11	900-42D203-01B	DISPLAY FILTER GLASS	1	
10	649-421D01-01	STAINLESS ROSS FDR 42D SPEAKER H45	2	
9	388-42SD01-01	PC SHEET FOR KEY PCB	1	
8	E3701-043060	PCB. KEY 16MM FDR PBP42SD	1	
7	614-260208-10	STP SCREW 2.6X8	3	
6	423-42S J08-01S	BRACKET-B FDR MAIN BKT 42SJ	2	
5				
4				
3				
2	277-46SD01-03S	FUNCTION KNOB	1	
1	200-42D102-SMK11A	FRONT CABINET BLACK W/AKAI	1	
ITEM	PART NO.	DESCRIPTION	QTY	REMARK

69	269-42SD01-01L	REMOTE RECEIVE LENS	2
68	E3701-051060	PCR VU REMOTE FOR 26LCTV TV+DVD TV FUNCTION	1
67	614-300107-00	SELF TAPPING SCREW BINDING HEAD 30X7.0	4
66	379-421D01-01	RUBBER BAG FOR 42IN SPEAKER	2
65	614-300120-00	SELF TAPPING SCREW B T BINDING M3X20	4
64	614-300126-00	TAPPING SCREW	14
63	206-42SD12-01	SPEAKER BACK CABINET 42IN BLACK	1
62	623-401812-00	TAPING SCREW B-TYPE TRUSS 4X12 B ZNP	4
61	422-42SD11-01	SPEAKER BRACKET	2
60	329-P46T01-01	SPK ABS/RSP SPONGE 450X100X20MM	1
59	422-42SD11-01	SPEAKER BRACKET	1
58	422-42SD02-01	SPEAKER BRACKET LEFT	1
57	623-401808-00	TAPING SCREW B-TYPE TRUSS 4X8	16
56	E4801-125001	SPEAKER 16 OHM 10W D3* YD78-2	2
55	613-300106-20	3-TAP SCREW TRSS 3X6	4
54	E4802-015001	TWEETER 6 OHM 10W D2* YDGS-2	2
53	205-42SD12-01R	SPONGE FRONT CABINET 42IN V HOLE SILVER	1
52	329-002510-50	SPONGE 25X10X3.0MM W/ADHESIVE	1
ITEM	PART NO.	DESCRIPTION	QTY

DRAWN.					TOLERANCE UNLESS OTHERWISE SPECIFIED	KAWA ELECTRONIC R & D CENTRE	TITLE PD421DMAIBS-A02		
CHECKED					0 MM~8 MM ± 0.1		MATL.	MODEL NO. 421D	
APPRD.					8 MM~25MM ± 0.15	FINISH		A2	PART NO.
<div>3rd ANGLE PROJECTION</div>					25MM~80MM ± 0.2		EXP-421D02-01		421DEXP1
					80MM~250MM ± 0.3				
					250MM~ABOVE ± 0.6				
					ANGULAR: ± 1°	SCALE NIL		QTY.	SHEET 1 OF 1

# If you forget your V-Chip Password

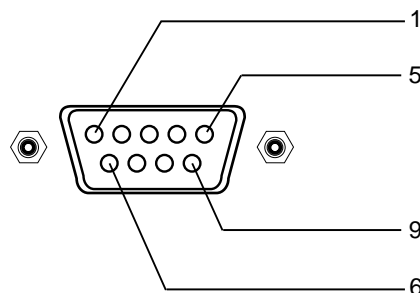
- Omnipotence V-Chip Password: **5898**.
- Press **MENU** button.
- Press **Up, Down** buttons to highlight "V-Chip" Control.
- Press OK button to pop up "INPUT PASSWORD".
- Use the Number buttons (0~9) to enter the omnipotence Password 5898.
- Press Down to highlight "Password change" Control.
- Press **OK** button to confirm and will pop up "Password Change" item.
- Change to your familiar Password again.

## Software upgrade

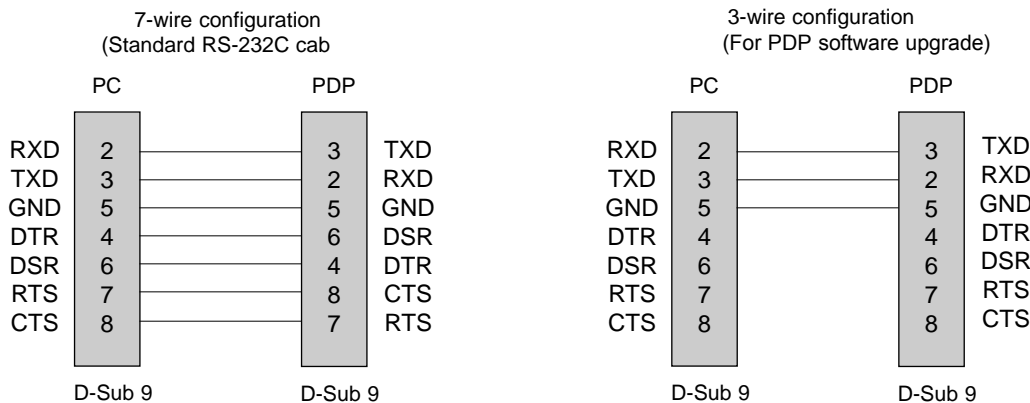
- Connect the RS-232C input jack to an external control device (such as a computer) and software upgrade.

### Type of connector; D-Sub 9-pin male

No.	Pin name
1	No connection
2	RXD (Receive data)
3	TXD (Transmit data)
4	DTR (DTE side ready)
5	GND
6	DSR (DCE side ready)
7	RTS (Ready to send)
8	CTS (Clear to send)
9	No Connection



### RS-232C configurations



## Software upgrade Process

- Power Switch OFF.
- Connect the serial port of the control device to the RS-232 jack on the PDP back panel.  
RS-232C connection cables are not supplied with the PDP.
- Power Switch ON. The power indicator on the front of the panel should now display red, means that the PDP is in standby mode.
- Copy the software (Flash Upgrader) to the computer.
- Open the software (Flash Upgrader.exe)
- Point "Flash" on the interface of the Flash Upgrader.exe.
- Press STANDBY button on the front panel or POWER button of Remote control, Power indicator green, the PDP is in power ON mode, software start upgrader immediately.
- Waiting for the upgrader programing, when it is finished, the PDP will auto power on.
- After the upgrader is finished, shut down the power switch, take out the RS-232C connection after the power indicator is extinguished.

Note: The computer and PDP must be keep **Power ON** in the software upgrade processing.